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[Founded in 1849 as the "Journal of Gas Lighting."]

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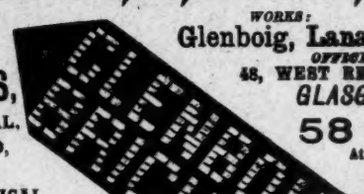

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EDITORIAL NOTES.

The New Year and a Good Resolution.

WITH all heartiness we wish our readers "A Happy and "Prosperous New Year," including any with whom in matters of policy it is not always possible to see eye to eye. No doubt most readers formed for themselves some good resolutions which were to come into operation on New Year's Day; and we have not the slightest hesitation in believing that some resolutions, excellent though they may have been, have already here and there been violated. But there is one resolution which we hope every individual connected, administratively or officially, with the gas industry has formed, or will form, and will not break. It is that individually and collectively thoughts and energies shall be directed to the promotion of plans to invest the industry with proper powers and conditions to meet the newly created economic circumstances, as well as the requirements of the country within the potential limits (which are large) of the industry. We have only to examine every tributary to the industry's well-being—costs in every direction, the technical work in every department, the regions from which business flows, as well as the prospective probabilities as to coal, electricity, and oil exercising all their strength (in the case of electricity a reinforced strength) to resist the advances of the gas industry—to see that there is much to be done by the industry, and that it must shape for itself a new progressive policy, which must be vigorously pursued.

We know there are men who say: "Leave things alone; "we were getting on well before the war." These are men who are mentally suffering from myopia. The "leaving of "things alone" by the gas industry would bring about its disintegration and, if not final extinction, its reduction to a much enfeebled condition. There are those who will say: "There is so much to be done that we do not know where "to start." No great work was ever accomplished upon which a start was not made somewhere; and any delay in beginning on the new work for the gas industry is only so much advantage to competitors, and therefore disadvantage to the industry. And it is a great work that has to be dealt with by the men of the industry and for the industry, which is worth all the energy and brain they can put into it. There are those again who say: "We cannot see "the nature of the new policy that has to be constructed, "adopted, and pursued." And some men never will, until it is put before their eyes in completed form, to mock their self-confessed blindness. The elements for the making of a new policy project themselves forcibly upon us from the legislative, financial, technical, and commercial regions; and we see the legislative and technical phases largely, but not completely, concentrated in product development—development quantitative or qualitative—per ton of coal carbonized. Though there may be men who cannot see what new policy is required and should be followed, there are strong under-currents flowing in the industry which are with certainty directing policy into very definite channels; and it is these channels that progressive men are anxious should not be left to chance utilization, but should be brought to bear to the fullest extent of their capacity on the industry's expansion and fortune.

There are many gas-works in the position to take advantage of the lessons of war time, to the benefit of the communities they serve, if only Parliament will assist and not resist their efforts. Gas men have learned how to produce, in gaseous form, a substantially greater number of B.Th.U. per ton of coal carbonized; and many gas-works can do this to the advantage of the national coal resources, and to that of gas consumers through the lower net cost per 1000 c.ft. of production—a net cost which is contributed to not only by the lessened quantity of coal that has now to be purchased (say) per million cubic feet of gas production (or it might be expressed in a specified number of B.Th.U.), but by the lower labour and capital costs. There may be a set-off in higher retort wear and tear and fuel. But we have our doubts when the measure of such costs is made not at per ton of coal but at per 1000 c.ft. or per a given B.Th.U. production. On the other hand, for a specified production of gas or B.Th.U., there will be a *contra* set-off in wear and tear on the coal and coke handling plant, seeing that less material would have to be handled. In this one direction alone, there is much to be done, to secure facilities from Parliament; and the constructional work of the industry, as well as the provision of certain characteristics in the consuming appliances, and the length to which the industry can go in serving the industrial and domestic fields, will largely depend upon these facilities being granted.

The Legislature will not, however, do anything without the industry helps itself; and one way in which it can help itself is to carry conviction to the powers that be as to the necessity of greater liberty in the matter of gas manufacture and supply. The same in respect of the secondary products. The powers that be must be shown that the gas industry possesses resources capable of plenary development to the advantage of the nation. The industry, it is very obvious, cannot face the new conditions of costs and requirement and intensified competition by simply reverting in other respects to the position occupied before the war. It cannot do this in the interests of the country nor in those of gas consumers and the investors in the gas industry. There are, however, some people who would have us do so—not only our competitors, but people within the industry. If their desires were gratified, not only would the consumers and the investors suffer, but the credit of the industry would never again be what it was. Ideals can be pursued to a degree that means material sacrifice; and we must be sure that the ideal justifies the sacrifice.

Then with this New Year let us away with apathy and inertia. They are forces which in the cause of progress can only produce negative results. Activity with sincerity coursing through it is a force which, rightly directed, must be constructive and must succeed if we are persistent, and do not yield to the first, second, or third repulse, or do not easily become disheartened in fighting for what we know to be right against an obscurantism armoured by legislation out of keeping with the times and their needs. Then let prevail the New Year's resolution mentioned in the opening paragraph of this article.

The National Gas Council Reconstitution.

THE gas undertakings of the United Kingdom are responding in an encouraging manner to the invitation to join the new National Gas Council; but the heavy demands upon time at the close of the year, combined with the Christmas holidays, have no doubt occasioned some delay in the case of a number of concerns. They may have put the matter off to a more convenient season; but in this case necessity should come before convenience. The question of fortifying the interests of gas undertakings by organization is of such importance (as must be patent on the most cursory consideration) that time should not be lost. The early meeting of Parliament and the likelihood of the Government promptly introducing legislation which will be of intimate concern to the gas industry, are alone reasons for its machinery being all ready for watching and fully authorized to take any requisite action. Furthermore, the arrange-

ments for getting the Council prepared for operation are, we learn, moving apace; and therefore it is essential that gas undertakings desiring to participate in the election of the members of the Central Executive Board should arrange for their forms of application to be lodged with the Council quickly—at any rate, at the latest by Jan. 31. The earlier the better, too, for the convenience of those who are voluntarily looking after this initial work on behalf of the industry. The programme leading up to definite formation, and putting the reconstituted Council into motion, is as follows: It is proposed that a meeting of the members of the reconstituted Council should take place in London one day during the week ending Feb. 22. This will be preceded by the postponed annual meeting of the present Council, to be followed by a meeting of the new Central Executive Board. Arrangements are also being made for the meetings of the District Executive Boards to be held before the date named, so that they may elect their officers and the representatives for the district on the Central Executive Board. Therefore the first thing to be done is to fill up the membership forms. The undertakings in each of the defined areas that are on Jan. 31 members of the new Council will then be immediately asked to send their representatives to meetings to bring into existence the District Executive Boards, with officers, and to appoint the representatives for the Central Executive Board. No one at headquarters will know the constitution of the Central Executive Board until after the District Executive Boards have spoken. It is a matter that will be entirely in the hands of the District Boards; and therefore the responsibility rests upon every undertaking in the kingdom to see that it takes part in sending the best men to voice the district views, to deliberate, and to vote. For the gas industry the elections should have as much interest as the General Election has had for the country at large.

Extension of the Co-Partnership Machinery—A Spontaneous Development.

ONE of the greatest and gravest problems that will face industry of all kinds after the war will be provided by labour. The Government recognizes this. Government Departments have been trying to devise plans whereby such problems may either be avoided or acceptable machinery may be brought into action for dealing with them, without permitting them to reach the height of a dispute as the altitude of open rupture and action, and a cessation of work. Active politicians—the Premier among them—see danger ahead, and have appealed to both employers and employed to recognize their identity of interest, and make that interest of a character which will influence a pulling together with a single eye to achieving the maximum possible prosperity. But by some inscrutable freak of fate, all the politicians, all these builders of legislation, who have spoken, have failed to appreciate the pregnant qualities of co-partnership to effect the very objects they have in view. Even the Whitley Committee in their second report stated that, after considering all the evidence at present available, they had come to the conclusion that they were not justified in putting forward any general recommendations as to profit-sharing and co-partnership. And not only were general recommendations omitted, but they avoided going even to the length of uttering anything of a commendatory nature for the application of co-partnership under conditions that lend themselves to general adoption. Now co-partnership—the South Metropolitan Gas Company have proved by long experience—is a system which is capable of being developed and organized to such a degree of perfection that it can be utilized to deal "at home," as between employers and employed, with all questions and problems that may arise, other probably than wages questions in so far as they are common to an industry, as distinct from any local variation. This is a far better position, it is a more intelligent solution of the problem of suitable machinery for dealing with all labour questions within the limits mentioned, than any outside body such as an Industrial Council, inasmuch as through co-partnership interest is rooted in an individual concern and its special conditions, and through it also there is recognition that there is mutual interest in other matters than the mere question of bonus which provides the means for share or stock holding. No outside body can deal with any difficulty or question with such intimate first-hand knowledge of all the circumstances as a body the members of which are an integral part of an undertaking.

This is a matter to which our consideration, and that of our readers, is invited by a report (published in later columns) of a meeting which shows an important development at the works of the South Suburban Gas Company, and which development, if we mistake not, has arisen from recent happenings and the feeling that there are rocks ahead in the labour world. It is a wise step that has been taken; and what we like about it is that it had spontaneous initiation from among the men themselves, and that their scheme was such an embodiment of sound principles and just and earnest desire that the Chairman (Mr. Charles Hunt) and the Directors had no hesitation whatever in at once accepting it, and facilitating its adoption. No one can read the report we publish of the meeting between the Directors and the men—and particularly the statesmanlike speech of Mr. Carter, the Secretary of the Sub-Committee (constituted of workmen only), who have been the prime movers in this matter, the extracts from a report the Sub-Committee had made, the wording of the resolution proposed by Mr. Ansett, the remarks of Mr. W. G. Waller (one of the Employee Directors), and the speeches of the Chairman and Mr. Charles Carpenter, D.Sc.—without feeling that in this Co-Partnership Company there is reciprocal loyalty and fair play, which is valuable testimony to the spirit that has been engendered by the co-partnership system. From every part of the proceedings, including the unanimous acceptance by the men of the proposals of the Sub-Committee, there projects the faith that the system can be expanded to meet modern requirements, and that (as Mr. Hunt in effect put it) its possibilities are not by any means exhausted. One thing is abundantly clear as we stand in the cross-roads leading from war to peace. It is that a more democratic spirit has come into our lives, and will persist and thrive. In this relation, co-partnership, as founded and nurtured by Sir George Livesey, and as now practised by many gas companies, was well in advance of this new movement.

It ought, before we proceed further, to be explained for the information of some of our readers, that the members of the Co-Partnership Committee of the South Suburban Company are elected half by the workmen and half by the Board. The workmen's section of the Co-Partnership Committee was appointed a Sub-Committee to consider certain matters affecting current labour movements; and the meeting and the resolution that was submitted were entirely the outcome of their unfettered meditations. The resolution that the Sub-Committee presented, and which the men have unanimously adopted, reads: "That this meeting of em-" ployee co-partners hereby agrees to accept the Co-Partner-" ship Committee as a Works Committee for the purpose of " adjusting any matter affecting our interests as employees, " in preference to any other form of Committee, and pledges " itself to adopt no other means for the settlement of any " matter at issue until the whole machinery of our co-" partnership system has been utilized without satisfactory " result." Attention is particularly arrested by the latter part of this resolution. It was framed and proposed by men who know by practical experience the co-partnership system for what it is, and who appreciate its capabilities; and they see also what the Whitley Committee without the same practical experience could not see. The words of the resolution should be read in conjunction with the comment in the Sub-Committee's report, which expresses extreme regret that the Whitley Committee refrained from making any recommendations with regard to co-partnership undertakings, as well as the conviction that Co-Partnership Committees can be adapted to carry out the functions of Works Committees more harmoniously and conveniently than any other form of Committee which excludes the special relations existing in co-partnership. There is here a dignified protest which, coming from the ranks of workers, including trade unionists such as some members of the Sub-Committee, is a stronger rebuke to the Whitley Committee than would be a similar expression of opinion from any other source. In considering this development (the importance of which forces itself upon attention more in respect of current circumstances than from the point of view of novelty, in view of the anterior developments at the South Metropolitan Gas Company's works), we feel that, whatever is done in future in promoting an Industrial Council for the gas industry, the interests of the co-partnership system must be safeguarded, so that no part of its operative power shall be destroyed in favour of something which, being wholly external, the Sub-Committee declare would be inferior. Apart from relative effectiveness, we can see, from the point of view of the men, that it is far better to have internal machinery to deal with

what should be purely domestic matters than to have an outside authority intruding, and enforcing its decisions other than in any matter that has universal application throughout an industry. However, the Workmen's section of the Co-Partnership Committee is now the Works Committee, with functions extended beyond its former scope. It will consider any matters that are brought to its notice by fellow-employees; and, if thought proper, recommendations will then be made to the Co-Partnership Committee as a whole, and through them the matters will come before the Board. If an Industrial Council is formed in connection with the industry or a Local Council established, this Works Committee will go armed with authority before such a body (if occasion requires) in a manner that would be impossible in a concern without similar machinery.

We strongly advise other gas companies—especially co-partnership ones—to look into this question of making the utmost use of the co-partnership system and the expansions of which it is capable. When and where feelings such as those which permeate the members of the Sub-Committee whose report and recommendations resulted in this development at the works of the South Suburban Gas Company—take, for example, the remonstrance which is made in Mr. Carter's speech over the exploiting of the war position for obtaining wages in excess of what could be justly claimed—we may with the fullest confidence look forward to the reign of a better and mutually helpful state of things between employers and employed.

Universal Gas Problems.

THOSE technical officials of gas undertakings who follow the reports given in our columns of the proceedings of Gas Associations abroad will not fail to have noticed that the problems of development in the manufacturing work of the gas industry in which so few gas men in this country appear to take a live interest (while the many maintain a listless attitude) are exciting widespread interest in other countries. This has been seen in the report of the German Association meeting, and now in the proceedings of the Dutch Association. There are signs of it in reports which have reached us from America; and it has been observed that Italian gas engineers have been driven to consider certain of them through the extremity to which war hurled them in respect of coal supplies. It is quite certain that the experiences of war time are going in all countries to have an immense influence upon the future policy of the gas industry. In our own, the result will depend largely upon the pressure that can be brought to bear upon those makers of legislative control which is not always conducive to economy and progress. There is no question about it that in most countries there will in future be a lower calorific power gas, greater yields of gas per ton of coal carbonized, and the use of water gas in one way or another—water gas produced by steaming charges or in separate generators—all with the view of obtaining more B.Th.U. per ton of coal, and yet at the same time reducing the coal bill per unit of output. Other countries must not get ahead of this one in view of the progress that has been already made here by independent workers. In Holland, we see from the report in other columns that the gas had the violent drop from 525 to 420 B.Th.U. through war circumstances; and the consumers were glad enough to get that gas.

Shall we, asked the President of the Dutch Association (Dr. L. J. Terneden), cease to be mere gas manufacturers, and concentrate our energies on making the utmost possible use of the coal? If we are progressive, there will be an abandonment of the old path along which gas men passed with self-satisfaction, and with a wasteful neglect of all save the gas they produced; and in their blindness the gas was not the best for the consumer. It is the duty of the gas engineer to concentrate on realizing from the coal the utmost possible. And the coal itself must be of a quality that contains the least amount of ash and refuse. The loss of manufacturing efficiency in gas and other products, and the depreciation of the coke through excesses of ash in coal, have often been the subject of comment in these columns; and remarks made by Dr. Bunte, at the German Association meeting, show that German gas engineers are paying much attention to the need, when order is restored, of having clean coal delivered to them if they are to derive from their processes the best efficiency and from their coke good value and reputation. But to return to Holland. The President of the Dutch Association said: "It behoves us not to sit still. "Chemical industry is advancing, and gas is, as it were, "at the root of chemical industry." It also behoves gas men in this country not to sit still. For long during last year, we have pleaded in these columns for the formulating of a new policy for the gas industry, and for such a policy not to be shaped without premeditation, but as the result of due investigation by a largely independent and qualified body. However, we stand much as we were, with men's thoughts, actions, and beliefs drifting just as their own intellects, prejudices, opportunities, or outside influences happen to direct. The industry has not yet gone the right way to work; and nothing much has been done to get it in the right way. It will not get into it without deliberate intention and resolve.

The Annual Rating Statistics.

Considerable changes are shown, when compared with recently preceding ones, in the latest issue of rates and charges statistics compiled by Mr. W. Allison Davies, the Borough Treasurer of Preston. It is for the financial year 1918-19; and side by side with the rates levied for this period, there has been placed a column showing those charged in 1913-14, which was the last completed year prior to the war. These parallel columns reveal the fact that, like practically everything else, rates have increased under war influences. Among the towns included in the statistics, there are three in which the rates are now over 13s. in the pound; and though they were all previously heavily rated, the rise during the war period has in each case been a very substantial one. There are in the present tables close upon eighty places mentioned in which the rates amount to 9s. or over in the pound; and this is just twice as many as appeared in the list only twelve months ago. On the other hand, there is now but one town rated at 5s. or less in the pound, as compared with two in the preceding returns. Charges made for gas and electricity, likewise, naturally exhibit a decided trend in the upward direction. A year ago there were three towns included in which the net charge per 1000 c.ft. for a domestic supply of gas for lighting purposes was 4s. or more; whereas on the present occasion there are upwards of thirty places so situated. Similarly in the present returns there are thirty-six towns with a charge of over 6d. per Board of Trade unit of electricity for a domestic lighting supply, as against fourteen a year ago. Future statistics will reflect the effects of a return to peace conditions; and when the time arrives for the publication of these, it is to be hoped they will prove that in many respects the figures in the 1918-19 tables recorded high-water mark.

The Disinterested Miners.

The coal miners of the country have no intention in future of over-exerting themselves; and they likewise wish to be well paid for their considerate attitude towards themselves. As pointed out in the "Retrospect" last week, they want a six-hour day, payment for afternoon and night shifts at the rate of six shifts for five actually worked, retention of their war rates of wages, and the merging of the percentage bonus into wages, and all sorts of other things. The South Wales Miners' Federation Executive have found a new reason for hastening the good work of shortening miners' hours, while the Coal Controller bemoans the shortness of coal output, and publishes statistics in proof of a very good reason existing for his distress, and other people are urging the suspension of the Eight Hours Mines Act, so that the miners may put in more time. The South Wales Executive, on the other hand, desire that the Act should be quickly amended to the shorter number of hours—six per day. Their reasons are that delay in complying with their views will (1) create a conflict between returning soldiers and *bonâ-fide* miners at present employed in the mines, and who have transferred from one colliery to another during the war; (2) create unemployment. Therefore they urge the Miners' Federation of Great Britain to at once take steps to get the proposal for the reduction of the working day so amended as to become operative at an earlier date, as unemployment is already here. We wonder what the Coal Controller has to say to this. It is also suggested by the ingenious South Wales Executive that, as a temporary measure, the Government pay, during the whole period of unemployment, a sum equal to the minimum rates the unemployed workmen would have received had they been employed. Regarding the

reduction of the miners' hours, seeing they have on the average taken good care not to work more days per week than their own inclinations dictated, there seems little reason in what they now ask, except that they want to have the maximum pay (the current rates are the highest ever experienced in the coal industry) for the minimum hours. The principle of an eight hours' day has become more strongly established by its recent concession to railway workers and in the engineering industry.

Searching for Oil in England.

A good deal of energy is being put into the work of searching for subterranean oil in this country. It only required the Government to give the necessary lead and financial support to ensure this. Whether the result be good or the reverse, it will have the effect of setting at rest all speculation and theory, of which we have had a surfeit of late. According to the "Petroleum Review" at the well being sunk at Hardstoft the drill is now considerably below 1000 ft., and the depth is increasing about 20 ft. a day. This is known as Test No. 5; and it is expected that the drill will be down to the intended depth of 4000 feet by May. In all, there are seven boring sites on the east side of Chesterfield, extending in a north and south line approximately 19 miles in length.

PERSONAL.

In the list of New Year Honours, among the promotions in the Order of the Bath to K.C.B. (Civil Division), appear the names of Mr. ALBERT GRAY, C.B., K.C. (Counsel to the Chairman of Committees of the House of Lords) and Mr. ERNEST R. MOON, C.B., K.C. (Counsel to the Speaker). Both these gentlemen are, of course, well known to Private Bill promoters.

On relinquishing the position of Chief Assistant Engineer and Manager to the Bath Gas Company, to take up his new appointment as Engineer and Manager to the Weymouth Consumers' Gas Company, Mr. CHARLES H. LANE was presented by the staff with a handsome oak stationery cabinet, and by the other employees with a Jacobean pattern silver tea-pot.

Mr. ARTHUR MARSDEN, A.I.C., F.C.S., recently received an appointment on the staff of the Bristol Gas Company, as Chemist to the Avon Street and Stapleton Road Stations. The work of the Company's chemical department having increased, Mr. EDGAR ENGLISH will devote his whole attention to Canon's Marsh and the test works. Mr. Marsden was trained under Mr. J. Ferguson Bell, of Derby, and for the past five years has been Chemist to the Bath Gas Company.

Mr. CHARLES CLARE (Messrs. Fletcher, Russell, & Co., Ltd.) was on Friday last installed Worshipful Master of the "Summum Bonum" Lodge of Freemasons, No. 3665. The ceremony took place at the Abercorn Rooms of the Liverpool Street Hotel, in the presence of the Deputy Provincial Grand Master for Middlesex and a large number of members of the lodge and visiting brethren. W. Bro. Clare was one of the Founders of the lodge, which was consecrated in 1913.

At a meeting to be held to-morrow [Wednesday], the Manchester City Council will have before them for consideration a recommendation of the Gas Committee to enter into an agreement with Mr. WILLIAM NEWBIGGING to act as Consulting Engineer to the Gas Department, as far as the existing plant of the undertaking is concerned, at a salary of £1250 per annum. It is also proposed to appoint Mr. Newbigging Consulting and Supervising Engineer in connection with the extensions under contemplation to the carbonizing and other plant at the Bradford Road Gas-Works of the Corporation.

Lord Moulton's Thanks to the Industry.

In a personal letter of thanks to various gas engineers, dated Dec. 31, Lord Moulton (the Director-General of Explosives Supplies) says: "Now that it has become no longer necessary for me to call upon the gas industry for the supply of raw materials for the manufacture of explosives, I desire to express my warm thanks to you and your staff for the keen co-operation with which you have worked with my department during the war. Not only has that help been of incalculable value, but in spite of innumerable difficulties it has been forthcoming with a readiness which could not possibly have been given were it not for the great issue at stake, to the success of which you have all so splendidly contributed. I am satisfied that the effort you have made will ever be a source of satisfaction to you, as it will always be remembered with appreciation by myself."

There has been officially issued for the guidance of manufacturers a statement [Notice No. 18] recapitulating the modifications in the control of materials and machinery which have been made to date by the Ministry of Munitions since the cessation of hostilities. The subjects specifically dealt with are priority, metals, chemicals, &c., and plant and machinery.

IN THE NEW PARLIAMENT.

SOME weeks ago, mention was made in the "JOURNAL" of the fact that Sir Hallewell Rogers, the Chairman of the Birmingham Corporation Gas Committee, had been nominated as Coalition Unionist parliamentary candidate for the Moseley Division of Birmingham; but when referring in the last issue to the results of the elections, omission was unfortunately made of his name from the list of successes noted. As a matter of fact, Sir Hallewell Rogers scored a striking win, with a majority of more than 12,000 votes over either of his opponents.

A member of the Edinburgh and Leith Gas Commissioners (Councillor William Graham) was the recipient of cordial congratulations at the meeting of the Commissioners on Monday of last week, on his election as Member of Parliament for the Central Division of Edinburgh. Mr. Graham fought in the interests of Labour. But he is not an extremist; his study of economics and social questions having given him a broad outlook. He has done much useful work on the Gas Commission, especially in connection with wages and labour matters. An able and fluent speaker, those who know him best entertain high hopes of his future career. He is only 31 years of age.

The number of officials of the Gas-Workers' Union (now known under its wider title of the National Federation of General Workers) who have secured seats in the new House of Commons has received a significant addition by the election for the Western Division of Nottingham of Mr. Arthur Hayday, District Secretary of the organization. The result has followed the careful nursing of the constituency in the interests of the Federation, of which Mr. Will Thorne is the head. West Nottingham was chosen for a trial of political strength, by reason of the fact that it is the centre of the chief gas-works in the city, and the habitat of a host of miners working in the neighbouring pits.

Other members whose names may be mentioned are Mr. E. Hallas, the Joint Secretary of the Amalgamated Society of Gas, Municipal, and General Workers; and Mr. J. R. Clynes, at one time the Secretary of the Gas Workers and General Labourers' Union.

PROPOSED NEW METHODS OF LAND VALUATION.

THERE has been issued by the Ministry of Reconstruction the second report of the Committee upon the Acquisition and Valuation of Land for Public Purposes, of which Mr. Leslie Scott, K.C., M.P., is Chairman. The first report recommended measures for cheapening, shortening, and simplifying procedure for obtaining compulsory powers for the acquisition of land; and in the second one attention is devoted to a suitable system for the valuation of land so acquired. The Lands Clauses Acts are declared to be out of date; and the Committee do not think that the fact of his land being acquired under compulsory powers for the public benefit should entitle an owner to additional compensation on this ground alone. They urge, therefore, that the conventional allowance for compulsory purchase (which in England and Wales is normally 10 p.ct.) should be discontinued. The Committee also recommend that an owner should not be entitled to any increased value for his land which arises solely from the suitability of the land for some purpose to which it could be applied only under statutory powers. The Committee make recommendations with a view to giving promoters greater freedom in acquiring and disposing of properties needed for their undertakings. A question to which they devote special attention is that of the constitution of the tribunal for assessing compensation. They unanimously recommend that existing systems should be abolished, and that fresh methods of procedure, which are explained, should be instituted in their stead. In the report, much importance is attached to an extended application of the principle of "betterment;" and to obviate the heavy costs now involved in arriving at values in this connection, the Committee suggest an extended utilization of machinery already in existence in the Inland Revenue Valuation Department. As to compensation for "injurious affection," they recommend that it should be confined to damage arising directly from the taking of the land, and that arising directly from the construction or use of the works in question. They conclude by remarking that a simple, quick, and economical system for the acquiring of land is essential alike to the development of the nation's resources and to sound progress, and that a new code established by legislation to replace that embodied in the Lands Clauses Acts "should involve a more complete acceptance of the principle of expropriation in the public interest than that which has prevailed in the past."

To-morrow evening, at St. Bride's Institute, E.C., Mr. J. H. Anderson is to read a paper before the Association of Engineers-in-Charge, on the "Transport and Handling of Fuel."

Colonel Bertram Hopkinson, C.M.G., F.R.S., R.A.F., late Professor of Mechanics and Applied Mechanics at Cambridge, who was killed in a flying accident, left estate of the gross value of £16,457. Colonel Hopkinson was known to many "JOURNAL" readers in connection with his work on internal combustion engines.

GAS BILLS FOR 1919.

[We shall be pleased to receive notification from Parliamentary Agents and others as to any late promotions of Gas Bills that may have been made, in accordance with the intimation of the Lord Chairman of Committees that such promotions would be entertained this session.]

[FIRST ARTICLE.]

THE end of hostilities came with such swiftness that the promotions of Bills dealing with gas supply are few. We commence to-day the review of the provisions of the Bills of which notice had been given at the regular period, and which are to be promoted in the ensuing session.

It was intimated in our digest of the notices of Bills that the Birmingham Corporation were promoting a Bill, one of the objects of which would be to increase the gas reserve fund, and make it applicable for use in the business of the undertaking. This proposal does not find place in the Bill now before us; and so our interest in it ceases. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The Bill of the Bournemouth Gas and Water Company deals chiefly with works, lands, and financial matters. The preamble of the measure gives the information that the issued capital now consists of £548,110, divided into 11,500 fully-paid preference shares of £10 each, entitled to a fixed preferential dividend of 6 p.ct. per annum, 5000 fully-paid original shares of £10 each, entitled to a standard dividend of 10 p.ct. per annum (subject to the operation of the sliding-scale), and £38,311 fully-paid "B" or additional ordinary £10 shares, entitled to a maximum dividend of 7 p.ct. The Company still possess authority to raise £150,001 by the creation and issue of ordinary or preference shares or stock. By the creation and issue of debenture stock to the nominal amount of £211,900, the Company have raised £210,176, and in addition mortgage debentures for the sum of £4750 (being the outstanding balance of the mortgage debt of the Christchurch Gas Company). The Company are empowered to raise the further sum of £89,838 by mortgage or by the creation of debenture stock. In regard to works, the promoters desire power to construct a cableway conveyor for the carrying of coal or other commodities from and into any of their gas-works, together with mains or pipes for the conveyance or transmission of gas. They ask for power to work the cableway conveyor by electric, steam, hydraulic, or any other form of mechanical power, or by animal power. For the purpose of this work, it is desired to have power to temporarily stop up roads. If the work is not completed within four years from the termination of the war, or from the passing of the Act (whichever shall be the later), then the powers are to cease, except as to so much thereof as is then completed. Land powers—compulsory or by agreement—are sought, as well as authority to acquire easements for the gas-main. The section entitling to the purchase of lands by agreement specifies: (*a*) Any lands and hereditaments not exceeding in the whole 25 acres which may be required for the purposes of the section of which the marginal note is "Dwelling Houses for Employees, Offices, &c., and Town-Planning Schemes;" (*b*) any lands and hereditaments not exceeding in the whole 5 acres which may be required for works and any other purposes of the undertaking. The section referred to in "*a*," is to empower the purchase or leasing of cottages or other buildings; and it also provides that "the Company may, either alone or jointly with any other company, body, or person, promote or carry into effect, or may contribute towards the cost of promoting or carrying into effect, any scheme of town planning which, in the opinion of the Directors of the Company, would prove beneficial to their employees or any of them." A succeeding clause provides for the amendment of section 19 of the Act of 1903, which refers to the construction and maintenance of gas-works. The section, it is proposed, shall be read and have effect as if, from the passing of the present measure, the proviso to it had been omitted, and as if, as from the date of the acquisition of lands in the Parish of St. James in the borough of Poole described in Part I. of the first schedule to the present measure, those lands had been described in the schedule to the 1903 Act. "The powers conferred by the said section as so amended shall be exerciseable with reference to all or any of the lands referred to in the said proviso, notwithstanding anything contained in any grant or lease under which the same or any of them are held by the Company, or in any agreement relating to the said lands or any of them." Provision is next made for the conversion of 5000 £10 shares, constituting the original capital, to capital with a standard rate of dividend of 5 p.ct. per annum, and comprising or forming part of the 5 p.ct. capital. Additional capital powers are required to the amount of £600,000, which may be issued as new ordinary shares or stock or new preference shares or stock. Of this amount, any sum or sums not exceeding in the whole £100,000 may, if the Company by resolution so decide, be raised by the creation and issue of new ordinary shares or stock forming part of the 5 p.ct. capital. After Dec. 31 next, the division of profits among the holders of ordinary and preference capital, it is proposed, shall be as follows: On the preference capital issued under the Acts of 1873, 1896, 1902, and 1903, at the rate of 6 p.ct. per annum; on any preference capital to be issued under the Act of 1913 or this one, such rate, not exceeding 6 p.ct., as shall be specified in the resolution creating such stock; on the original capital (until the conversion into 5 p.ct. capital), the rate of 10 p.ct.; on the 5 p.ct. capital, the rate of 5 p.ct.; and on the additional capital issued and to be issued under the Acts from 1873 to 1919, otherwise than as preference capital or 5 p.ct. capital, the rate of 7 p.ct. per annum. The dividends on the original capital (until conversion) and the 5 p.ct. capital will be subject to the provisions of the sliding-scale. Borrowing powers at the usual one-third rate are desired; and authorization to issue redeemable preference capital and debenture stock is sought. The standard price on which the sliding-scale is based is 4s. 6d. Nothing in the sliding-scale clauses is to interfere with or affect the operation of section 28 (Price of Gas in Christchurch District) or section 29 (Price of Gas in Area in Third Schedule) of the Act of 1913. The following clause applies to ordinary capital other than the original and 5 p.ct. capital

(1) In respect of any half year in respect of which dividends are paid on the original capital (until the conversion thereof pursuant to this Act) and the 5 p.ct. capital at rates not less than 7 p.ct. per annum and 3½ p.ct. per annum respectively, there shall be paid on the ordinary capital (other than the original capital and the 5 p.ct. capital) a dividend at the rate of 7 p.ct. per annum.

(2) In respect of any half year in respect of which dividends are paid on the original capital and the 5 p.ct. capital at rates less than 7 p.ct. per annum and 3½ p.ct. per annum respectively, there shall be paid on such other ordinary capital as aforesaid, a dividend at a rate less than 7 p.ct. per annum by 1 p.ct. per annum:

(*a*) For each 1 p.ct. by which the rate of the dividend so paid on the original capital is less than 7 p.ct. per annum; and

(*b*) For each one-half of 1 p.ct. by which the rate of the dividend so paid on the 5 p.ct. capital is less than 3½ p.ct. per annum.

And so in proportion for any smaller fraction representing or comprised in the diminution below 7 p.ct. or 3½ p.ct. of the rate per centum per annum of the dividend paid on the original capital and the 5 p.ct. capital respectively.

Annual meetings are provided for. It is proposed that, in respect of the rate of interest on mortgages and debenture stock, section 49 of the Act of 1896 shall be read and have effect as if the words 6 p.ct. per annum had been inserted therein in lieu of the words 4 p.ct. per annum. Clauses affecting profit-sharing and savings, together with a few administrative and miscellaneous clauses, are also included. [*Parliamentary Agents: Messrs. Dyson & Co.*]

In the main, the Bill the Hartlepool Gas and Water Company are promoting refers to the water undertaking; but there are parts applying to the gas undertaking. By the Company's Act of 1900, the capital was converted into £587,000 of ordinary stock, entitled to a maximum dividend of 5 p.ct. per annum; and the Company were authorized, in lieu of certain then unexercised powers of raising capital under the Act of 1898, to issue such ordinary stock to an additional nominal amount not exceeding £112,000, less the amount of any premiums which might be obtained by the sale thereof. Further authority was given to raise additional capital not exceeding in the whole (including any premium) £150,000 by the issue of ordinary stock, or by the issue of preference stock (carrying a dividend limited to 5 p.ct. per annum), or partially by each of these modes. In respect of the capital of £112,000, the amount still remaining to be raised is £43,517; and pursuant to the Act of 1898 this amount when raised may be used only for the water undertaking of the Company. In respect of the capital of £150,000 the amount still remaining to be raised is £112,695; and pursuant to the 1900 Act this amount when raised may be used only for the gas undertaking. The total borrowing powers of the Company amount to £157,500; and of this sum £100,000 is authorized to be borrowed in respect of capital comprised in the £587,000 of ordinary stock, £20,000 is authorized to be borrowed in respect of the capital of £112,000, and £37,500 is authorized to be borrowed in respect of the capital of £150,000. Of the borrowing powers, £35,000 still remains to be raised. In regard to £50,000, being part of the borrowing powers already exercised, the Company are by the Act of 1878 precluded from paying any rate of interest exceeding 5 p.ct. per annum on the loans or any renewal thereof. That is the capital position of the Company, as disclosed by the preamble of the Bill to be promoted this next session. The first clauses deal with the new water-works. Then the Company ask for power to purchase gas from any outside source, and to lay mains and pipes for the purpose. They also desire authority to contract for the supply in bulk to outside authorities or companies authorized to supply gas. The additional capital powers desired amount to £100,000. As to the power conferred upon the Company by previous Acts, of issuing stock to the amount of £112,000, it is desired that the balance may be issued as new preference stock if so determined, with the limit of dividend at 7 p.ct., instead of 5 p.ct. As to the additional capital, a limit of 5 p.ct. is suggested on any issued as ordinary stock and 7 p.ct. on the part issued as preference. Borrowing powers, it is asked, shall be placed at one-third part of the existing and additional capital. Redeemable preference and debenture stock powers are sought. [*Parliamentary Agents: Messrs. Wyatt & Co.*]

The Huddersfield Corporation have lodged a Bill to authorize the transfer of the undertakings of the Longwood and Slaithwaite and the Kirkheaton, Dalton, and Lepton Gas Companies, as well as to confer other gas powers. Agreements have been entered into with both Companies; and these accompany the Bill as schedules. From them it is seen that the capital of the Longwood Company consists of £18,100 of consolidated preference stock

entitled to a dividend of 4 p.ct., and £100,400 of consolidated ordinary stock, entitled to a standard dividend of 5 p.ct., subject to the sliding-scale. The Company have also borrowed £49,420. The price to be paid to the Company is £117,595, of which £17,195 represents the £18,100 preference stock at the rate of £95 p.ct., and £100,400 the like sum of ordinary stock; the Corporation paying the interest of 4 p.ct. on the preference stock, and 5 p.ct. on the ordinary stock up to the date of transfer. The Corporation are to satisfy and discharge all the debts, liabilities, and obligations of the Company. From June 30 last, the undertaking is deemed to have been managed and carried on by the Company for and on behalf of the Corporation. As compensation for loss of office, the Directors are to receive £480 to be divided equally between them; and to Mr. J. H. Brearley, the Secretary and Engineer, if he be living on July 31, 1919, £4000 is to be paid. The capital of the Kirkheaton Company amounts to £6000, and its present liabilities to £1424. The purchase price is £6600. Any compensation (if any) due for loss of office is to be paid by the Company. Returning to the preamble of the Bill, it is pointed out that it is expedient to make further provision in regard to the Corporation gas undertaking; and the estimate is £100,000 for and in connection with the construction of gas-works, the laying-down of mains, and the general purposes of the undertaking. Coming to the clauses, provision is made for the confirmation of the agreements as to transfer, for the mortgage debts of the Longwood Company continuing a charge on the undertaking, and for the winding-up of the affairs of the two Companies. A number of miscellaneous clauses appear, followed by a proposal for a calorific standard of 450 B.Th.U. gross, and the pressure is to be not less than 15·10ths. The price to be charged for gas in the urban districts of Golcar, Lepton, Linthwaite, Kirkheaton, Marsden, Slaithwaite, and South Crossland, and in the township of Fixby may exceed the price charged for gas supplied in the borough by not more than 6d. per 1000 c.ft. The Corporation are asking authority to make, purchase, and supply power gas, which may be utilized for any purpose other than flat-flame lighting. The clauses in this regard are of the usual order. As to finance, the Corporation require such sums as may be necessary for the purchase of the Longwood and Kirkheaton Companies, with a period of forty years for repayment; and £100,000 for the construction of works, the laying of mains, and the general purposes of the undertaking, also repayable in forty years from the date of borrowing. Any further moneys, it is suggested, shall be borrowed with the consent of the Local Government Board. Power is also taken for the redemption of the Longwood Company's mortgages. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

For the purpose of housing accommodation, the Leeds Corporation have agreed to purchase certain lands in the township of Middleton in the rural district of Hunslet. It is proposed by the Bill lodged by the Corporation to extend the boundary of the city so as to include so much of the Hunslet district as comprises Middleton. All Local Acts are to apply to the extended area; and this will, of course, include the powers governing the city undertakings. It is contemplated that the added area shall cease to be within the supply area of the Yorkshire Electric Power Company. [*Parliamentary Agents: Messrs. Sharpe, Pritchard & Co.*]

The Newark Gas Company are trying to raise additional capital, to erect further gas-works, and to extend their limits of supply. The share capital now consists of 500 £10 "A" shares, entitled to a dividend of 10 p.ct. per annum; 500 £10 "B" shares, entitled to a dividend of 5 p.ct.; and 3080 shares of £10 each, entitled to a dividend of 7 p.ct., of which £26,300 has been raised. The Company have also received from the issue of shares premiums to the amount of £4076. No debenture stock has been created. Turning to the clauses, power to purchase land by agreement is asked. New works clauses have the residuals powers attached, with the proviso to the purchase section—"that after the termination of the present war, the quantity of any residual product so purchased by the Company in any year shall not exceed one-third of the quantity of the like residual product which shall in that year arise directly or indirectly from the manufacture of gas by them." The Company propose to embrace in their limits a number of parishes or townships in the county of Nottingham, in which extended area they ask to be allowed to charge for gas a price not exceeding 6d. more than is charged in Newark. The Company are seeking authorization to supply power gas. For the ordinary gas supply, a calorific standard of 500 B.Th.U. is proposed, with the pressure of gas at 15·10ths. The Company ask for authority to apply for a Provisional Order for the supply of electrical energy; and, in this connection, they wish to be empowered to acquire by agreement electrical undertakings from local authorities and others. The additional capital desired is £50,000, with borrowing powers levelled-up to one-third. The limit of interest on borrowed money, it is proposed, shall now be 5¼ p.ct., instead of the 5 p.ct. specified in section 22 of the Order of 1895. Power to issue redeemable preference capital and debenture stock is also sought. Annual meetings are provided for. The other clauses are of ordinary form. We do not see the proposal as to railway sidings as indicated in the original notice of the Bill. [*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

It was stated at the annual meeting of the Swiss Union of Gas and Water Engineers that the separation of water from tar at Swiss gas-works is now effected by centrifugal machines, which reduce the water content of 60 to 70 p.ct. to 5 p.ct.

ELECTRICITY SUPPLY MEMORANDA.

REVIEW OF THE PAST YEAR.

THE electrical industry looks upon the past year with mingled feelings. It is a year in which, in common with the gas and other industries, it has experienced the highest point of intensity of the repressive conditions of war time; it is the year which will stand out in its history as the one in which the plans for its regeneration began to be outlined.

TRADING EXPERIENCES.

In its trading, the industry has felt the full effect of heavy prices, shortage of material and labour, and regulations which prevented it doing the business which might otherwise have been done. The prohibition which prevented electricity supply concerns utilizing the difficulties imposed upon the gas industry by its war services was not accepted by it very graciously; nor was the additional bar to making new connections which the Coal Controller had to insist upon owing to the coal situation. There were signs of irritation over the curtailment of liberty. Moreover, there was until the armistice further restriction of shop and public lighting; and, upon the summer time reduction of lighting business, there was first the five-sixths rationing scheme, and then the Fuel and Lighting Rationing Order, which also caused great business declension. The output was seriously interfered with in purely residential and shopping centres which the fraction of the heating business of the districts done electrically did not, at the lower prices charged per unit than the lighting charge, do anything to assist commercially. Where large business was done through munition activity, it was not on the high-priced units, but on the low-priced power ones; so that proportional with the increased output, there was not the supplement to income which could have been desired. And now that there will be a heavy drop in demand for munition work, it is expected that for some time to come several stations will find themselves with a large amount of surplus plant. There was at first a disposition to protest against the Coal Controller's allocation under the rationing scheme, of 800 units as the equivalent per ton of coal; but it was an easy matter to show that Sir Guy Calthrop had been much too generous, seeing that only an isolated station or two under exceptionally favourable conditions was able to generate current at 2·8 lbs. of coal per unit, and that the average expenditure should actually be below this weight per unit to justify the 800 units delivered, with distribution losses taken into account. As a matter of fact, the Coal Controller showed that the county averages of coal consumption per unit generated ranged from 2·48 lbs. to 16·92 lbs.! Thus the Coal Controller himself could not vindicate the coal equivalent allowance he had made for electricity for heating purposes.

CHARGES TOPICS.

The condition of advances in outgoings and not proportionate increases of income resulted in a further all-round raising of charges for electrical energy; but, as is the custom with the electricity industry, in many cases the heaviest increments fell upon the lighting consumers—the tender plants, heating and cooking, being favoured like weakly children. Some of the undertakings had to apply for an addition to their maximum prices; but there were protesting voices and pens when it was found that electricity supply had been placed in the arms of the Temporary Increase of Charges Act. The electricity companies, with substantial dividends and high prices, are keeping out of its way. Some local authority undertakings have had to make application under it in order to get ends to meet; but they are not altogether pleased with the condition that puts it out of their power to utilize the Act for the purpose of raising prices to an extent to produce profits in aid of the rates. Generally speaking, hard-pressed municipal undertakings preferred charging for current under a commercial price, and calling upon the ratepayers to meet the deficits—a form of robbery which is not right in normal times, but totally unpardonable in these times of heavy individual obligations. There was also strong disapproval on the part of the managements of electricity undertakings of the action of Sir Guy Calthrop in listening to the protests of consumers who were complying with his appeal to economize, and were then faced by the electricity suppliers with a demand for a minimum charge. Naturally the consumers could not see the equity of this. The common minimum allowed is 13s. 4d. per quarter (there are a few variations from this); and Sir Guy suggested £1 a year, with adjustments effected quarterly, unless it had been the practice to charge a less amount, in which case the less amount should be the maximum.

PLANT AND COKE FUEL.

During the year there have been supply breakdowns, which have mostly been attributed to the overloading of plant, or to the enforced refusal of the authorities to grant special facilities for extensions and renewals, unless a proved necessity for munitions work was forthcoming. Now that munitions work has stopped, there will be (as previously said) in many places a good deal of spare plant, which will not all be commissioned again until the good times come when reconstruction has caused the imports of gold to British industry to be of larger volume than hitherto. Already a considerate Government Department has sent forth

solicitous inquiries as to the estimates for immediately required extensions and improvements of electric plant. Never has an industry had so much care expended upon it. There appear to be under-currents of influence Westminster way which are highly favourable to the electricity industry, and a rich compensation for the other difficulties of war time which circumstance enforced. Even the Coal Controller's reproof over the waste of coal in electricity stations—which he and his technical advisers could not attribute entirely to bad load factor, inefficiency of plant, or ash-laden coal, but largely to the inefficiency of supervision—and his appeal for greater economy, were sweetened by his indulgence in respect of the 800-unit allowance as the equivalent of a ton of coal for heating and cooking purposes. The high ash content of coal has, of course, in places depreciated boiler efficiency; and, combined with the heavy prices of fuel, it was found that fuel costs for generating doubled—in some cases more—those that obtained in pre-war days. The electricity industry, however, were only companions in adversity with the gas industry in this respect. The shortage, too, of coal and the outlook for this winter caused greater attention to be paid to the utilization of gas coke; and many electricity stations have found that, with forced draught equipment and proper feeding arrangements, coke and coke breeze are aids to higher evaporative duties as well as to economy. These things have practical proof which is the answer to those electrical engineers whose experience, through inimical conditions, is of a contrary nature. Mr. E. W. L. Nicol, the expert of the London Coke Sales Committee, has shown how the higher evaporative duty is realized; and a much-favoured means is the systematic combination of coal and coke—the one having an exhilarating effect upon the other. The use of gas coke for electricity production is a growing one not only at public generating stations, but at private ones, and by manufacturers requiring also steam for other purposes and hot water. It is a direction in which every means should be taken to secure cultivation. Much has been said during the year as to the use of lower-grade fuels for electricity generation. For boiler firing for the one purpose of producing steam the use of bituminous coals ought to be strictly prohibited, with the view of prolonging their supply to the carbonizing industries for the production of materials essential to the maintenance of other industries.

Efficiencies.

In any circumstances, there will be some interest and value in electricity stations adopting a better method than at present exists when showing and comparing plant efficiencies. The only way is on a thermal basis. But the thermal efficiency of the generating system being so poor, the idea does not commend itself to electrical engineers—not even if working at that exceptionally high figure for this country of 9 p.ct. against the average of between 5 and 6 p.ct., and the worst figure of all of 1·5 p.ct. Yet the Coal Controller allows coal to be carried about the country for utilization with these low efficiency results, and then permits 800 units to stand as the equivalent of a ton of coal! We doubt whether this has any rival in grotesqueness among all the incidents of war time control. No wonder too the electricity industry looks askance at any suggestion to sell "fuel" on a B.Th.U. basis. They buy coal on a calorific basis, but they would not like gas and electricity to be sold on this basis. They protest that their electric radiators and their ovens, but nothing else, have a high efficiency—not in relation to the coal used at the generating station, but in relation to the thermal power of the electricity supplied to them. There is a deep gulf between the B.Th.U. delivered by gas and electricity for a given price, which gulf the efficiency of electric radiators and ovens cannot span, leaving out of comparison all other lower efficiency electric heating appliances.

A Larger Place in the Sun.

But the electricity industry wants to do better. There is all the condensing plant that has to be provided at the stations. There are visions of generating stations becoming the centres from which hot water should be distributed, so causing hot water to become a bye-product. Those who look into the question of capital expenditure for conveying hot water with the minimum of thermal loss find its weight to be an obstacle. The variation of demand for hot water during the day and at different seasons is a matter to which there cannot be indifference in considering the possibilities of financial success, as opposed to the imposition of a fresh burden upon the electricity industry. In this relation, too, there has been a rubbing of the eyes to see whether there cannot be a larger place for the electricity industry in connection with the furnishing of conveniences in the domestic and industrial spheres. Electrical men want to have a big part in the new housing problems. They are not saying a great deal now about the all-electric house, as (much against their will) they have at last been persuaded that the efficiency of combustion methods totally eclipses electricity for heating on an economic basis. They have hoped that electro-culture would help them. But this is a plant that has withered during the war, though a few enthusiasts seemed to think it was something that ought to help the country to be self-supplying as to its food during the war. But it did nothing of the kind. The best results are obtained by electro-culture where artificial manures are used as intensifiers! The questions of the cost and the effects on the physical characteristics of the growths under electro-culture have yet to be determined. Other hopes are that electricity will be extended for driving agricultural machinery. Here it will be as between motor spirit and electricity a question of cost. Such demand would be seasonal for all large operations, and intermittent for small ones. Industrial power is another branch in which it is hoped to do much bigger things. There has been talk of the Government interfering with the freedom of the subject, and making it compulsory for manufacturers to take their supply of energy from the district electric mains. But every manufacturer must be allowed to obtain his energy in the most economical way. And it has been shown that in the large emporiums in London boiler plants are required for the supply of steam and hot water, as well as for electricity generation for lighting and power—both stationary and vehicular; and distributed electricity cannot compete in cost. The same in large factories—steam, hot water, gas, and electricity are used in them, and the combination is conducive to cheap output, with which recently published figures have shown electricity transmitted from a distance cannot compete. Parliament cannot interfere in these matters; and we will be frank, the gas industry does not want Parliament to do so, because it has its eyes on a large business in power gas and a more extensive field for its coke. In the metal industries, too, the electricity industry is hopeful of the progress of electric-furnaces, and the stopping of the flow of adoption of gas-furnaces, which have had a utilization in industry during the war which will have a good effect in future. The electric-furnace has had a comparatively small adoption; and it has its limits in special work. As one authority recently stated, it "does not claim to be a cheap melter in coal-producing countries; its claim to recognition being its ability to provide controllable high temperatures in reducing atmospheres."

Cooking and Heating.

In cooking and heating also the electricity industry is looking for a larger place. But there again hope has an impregnable boundary in the poor thermal efficiency of electricity generation. In domestic heating, the electric fire can only secure adoption for intermittent purposes; and even had there not been during the year the embargo on new connections, the price of energy would have stopped any substantial growth of this business. The electric-oven has had a share in the National Kitchens and in industrial canteen work. In certain installations in National Kitchens and some Government factories, we have seen the hand of interested influence. But there has been large proof through this fresh work that for hot-plate operations and water heating electricity has no chance in the commercial race. Some of these installations have been called "all-electric;" but it has afterwards been found that gas-works products have played a large part in providing steam and hot water. In some cases to save the face of electricity, the cheaper methods have been used at the rear for pre-heating, while in the public eye the water so preheated is passed through electrically heated appliances. The pretence is highly amusing. But deception of the kind cannot live, as the electrical people are finding to their cost. Much has again been heard of the shrinkage-of-meat question—the last trench of the electricians. It is acknowledged that electric-ovens can be worked at temperatures that will shrink meat up as the electrical folk falsely represent it is under any circumstances shrunk by gas. They ignore the fact that gas-ovens can be worked at any temperature the cook likes. If meat only partially cooked is required, the gas-oven can oblige equally with the electric-oven. One point the electrical people have made much of is that with low-temperature working, and consequently longer duration cooking, the nutritious juices are retained in the meat. Investigation by the British Commercial Gas Association has shown that the contrary is the fact—that too low a temperature, with delay in the cooking, facilitates the escape of the nutritious juices with the dripping. Slight consideration will convince that the conditions must allow the joint greater freedom for perspiration with disastrous results. The facts connected with the contest which was carried out through the acceptance by the British Commercial Gas Association of a challenge issued by Mr. Belling, and the fearful catastrophe it proved for electric cooking from the cost and other points of view—including national economy—are well known to our readers through having occurred recently, and, therefore, do not need repetition here. The electrical people have since been busy trying to belittle the results of the contest, and have been manufacturing excuses for not taking part in further contests to prove or disprove their own claims. It has supplied one of the humorous incidents of the year—"one" because there are others, such as the claim that coal economy was to be secured *vid* the electrical process with its average of 5 to 6 p.ct. thermal efficiency. In connection with cooking and heating, it may be noted that the Institution of Electrical Engineers have formed a Commercial Electrical Development Committee.

A National Electricity Reformation Scheme.

All this shows that one of the most important things the electricity industry has to do is to produce greater economy in the provision of heating energy. There have been two inquiries and two reports directed to this end by Government Departments. An Electrical Sub-Committee of the Coal Conservation Committee of the Ministry of Reconstruction first reported, and gave the country a fantastic report with wonderful estimates, and no less wonderful plans in words, for giving the country a cheap supply of current for all purposes. It was all very vague and too highly coloured. The attack on the municipal suppliers of electricity, and the suggestion that they should be relegated to the position only of salesmen of current, aroused great resentment.

Then came the Electric Power Committee of the Board of Trade; and, after inquiry, they issued a more dignified report, which has also been met by much criticism in respect of details, although the principles on which it is based have a considerable acceptance. Technical opinion is sharply divided as to whether all the good will be realized that it is prophesied will come out of the super-generating stations in the way of economy. Super-stations cannot be placed anywhere; and transmission costs are not negligible. There is a limit to the size of unit which will achieve economy in fuel and other expenses. There is no proof at the back of the schemes; and there cannot be proof except by trial. Already there is some amount of reaction. Electrical engineers are beginning to see clearer that economy in one direction may be counterbalanced by losses in others. However, there are certain things that are already accepted, and which will give to the electricity industry a preference over the gas industry. The Board of Trade Committee, in their report, propose that a Board of Electricity Commissioners shall be set up to deal with electrical legislation, so as to produce simplification and co-ordination. Secondly, that there shall be District Boards whose duty it will be to take over all generating stations, close-down the uneconomical ones, and in time supersede the whole lot by large central stations where the maximum economy can be ensured. The present distributors would then become the customers of the power generating Boards. There is, however, internal strife over the constitution of the Boards. Some municipal authorities and the Incorporated Municipal Electrical Association only want to have municipal bodies and large consumers in the membership, with the companies having no part or voice in the management of the generating affairs. The injustice of this has recently been discussed in the "Memoranda." Another thing which pleases the electrical industry is the suggestion as to Government financial support. Why the electricity industry should receive such preferential treatment has not been explained; and there will be much to be discussed as the matter proceeds, for it is obvious that legislation and financial support ought not to be of a character that will advantage one industry to the disadvantage of another. The scheme is to be the subject of a Bill. The Premier makes the improvement of electrical generation an item in Government policy. The politicians have given the project their blessing; so has Sir H. Rider Haggard, and so has Miss Pankhurst! It is hailed as one means to regenerate the social life of the country. Men of technical knowledge in the electrical world of a capacity the equal of that of those who have been advising the Government, are doubtful; and any way nothing can be done in producing economy except by gradual and systematic courses. One way has not yet been considered; that is through the help of the gas industry. National economy not in one direction only but in as many as possible is what should be the aim of any revision of policy; and there has been no inquiry outside the scheme upon which certain enthusiasts have set their minds. The Board of Fuel Research has not spoken; and national coal economy is part of their investigation. This reminds that the Coal Conservation Sub-Committee proposed coal carbonization as part of the generating process; and the Board of Fuel Research secured the suspension of this part of the scheme pending the results of their investigation. The Chemical Manufacturers' Association intervened in the matter of certain Power Bills before Parliament last session which proposed carbonization and the working-up of the chemical products, and secured the deletion of all such suggested authorization.

PREFERENTIAL TERMS.

In the retrospect published in the "JOURNAL" last week, it was remarked that the Hackney preferential charges case would no doubt be referred to next week in the summary of "Electric Supply Memoranda." The appeal in this case applies to 1917, and not 1918; and it was alluded to in our "Electricity Review" in the "JOURNAL" for Jan. 1 last year, with an editorial article in the same issue on p. 13. To what was said then, nothing need be added now.

Société Technique de l'Industrie du Gaz.

It is announced in the current issue of the "Journal des Usines à Gaz" that the present year will witness a resumption of the congresses which in the period before the war were organized by the Société Technique de l'Industrie du Gaz, and were the source of many valuable contributions to the advancement of the gas industry. The congress for 1919 is to be held in one of the towns of reconquered Alsace or Lorraine, and appropriately will include among its functions a celebration of the services which have been rendered to France, not only by those who have fought, but by others who are distinguished by long civilian service.

Satisfactory results are said to have attended experiments which have been made in Switzerland with mixtures of acetylene and coal gas; the object being the replacement of the usual mixture of 67 p.ct. of oil gas with 33 p.ct. of acetylene. It has been found that a mixture of coal gas and acetylene in equal proportions gives the same illuminating power as the oil-gas combination. The experiments have further shown that this mixture of gases may be put under a pressure of 9 atmospheres, and heated up to 100° C. without danger.

THE NITRATE OF SODA POSITION.

IT is quite evident that nitrate producers have an anxious time ahead of them, say Messrs. W. Montgomery & Co. Ltd., in their half-yearly report. The recession in the price of nitrate of soda which was witnessed during 1917, continued the first month or two of the past year [1918]; and quotations, which were about 12s. 6d. per quintal f.o.b. Chili in January, became about 10s. 6d. by the end of February. Early in June, however, some understanding between the Allies and producers resulted in the sale of a considerable quantity to the Government at an advance of 1s. per quintal; and this restored the price to 12s. 6½d. and 13s. 0½d. per quintal respectively for ordinary and refined qualities—and left the producers still hoping that, with the assistance of the Chilian Government, they would manage to obtain another 1s. per quintal for further supplies. The matter was compromised in July; and another gain of 6d. brought prices to 13s. 0½d. and 13s. 6½d., on which basis business was done until the signing of the armistice resulted in a total cessation of purchases. In their opinion, it is almost certain that these nominal prices can no longer exist under the new order of things. It is pointed out that, in considering the phases of the after-war position, one must not forget that, without the aid of 9 million quintals from German oficinas, production has exceeded by about 2 million quintals the maximum pre-war figure, which was then felt to be so burdensome that schemes were being considered by the producers for the protection of prices. Now, as the German oficinas will be re-opened by the Germans themselves or by others, there is the possibility of production increasing to 73 million quintals or more.

Dealing with the same subject, Mr. Thomson Aikman, jun., in his annual report, says there is little doubt that nitrogenous fertilizers will be in greater supply than before the war. In the last pre-war year (1913), it was estimated that, of the total quantity of nitrogen consumed, 55 p.ct. was in the form of Chili nitrate, 40 p.ct. sulphate of ammonia, and 5 p.ct. synthetic nitrate. During the war, practically the whole production of Chilian nitrate has been used for making munitions for the Allies; and it must therefore be assumed that Germany has greatly increased her production of sulphate of ammonia and all forms of synthetic nitrogen, in order to supply herself with munitions. But whether the cost of production is at a low enough figure to warrant the continued use of the plants installed for this purpose, is not yet known. In America, France, and this country plants for the manufacture of synthetic nitrogen have also been erected; but the quantities produced up to date are believed to be comparatively small. It may be assumed that, as the manufacture of explosives has practically ceased, considerable stocks of nitrate remain in Government hands, especially in America; and it is evident that, to avoid amassing unwieldy stocks before conditions are sufficiently normal to permit of their distribution to consuming markets, producers will probably require to restrict their production during the first half of this year, which would appear to necessitate a general closing-down for about three months. The past year has been satisfactory to producers, and favourable results are likely; but the current year, Mr. Aikman agrees, owing to the abnormal conditions ruling, is one of uncertainty.

The Board of Agriculture now announce that the Government can offer a certain amount of nitrate of soda for delivery in the early months of this year for agricultural purposes. The price to farmers will be £20 per ton in bags, for nitrate in quantities of not less than 2 tons delivered to purchaser's nearest railway station in Great Britain, or free on board port in Great Britain in the case of deliveries to Ireland. The material offered is of the grade usually known as refined nitrate of soda, 96 p.ct. pure.

Midland Junior Gas Association.—There is to be a meeting of the Association in the Council House, Birmingham, on Thursday evening of next week, at which Mr. F. S. Townend, B.Sc. (Eng.), of the Nechells Gas-Works, Birmingham, will read a paper on "Centrifugal Fans and their Application in Gas Manufacture and Distribution."

Making Gas from Peat.—In an article appearing in "In genioren," details are given of some experiments which have been carried out at the municipal gas-works in Copenhagen, for the purpose of producing gas equal to Dowson gas from peat instead of from coke. The peat used contained 28·4 p.ct. of moisture and 13·6 p.ct. of ash; and 39·4 lbs. of peat produced 1000 c.ft. of gas, with a calorific value of 146 B.Th.U. per c.ft. The cost of the peat supplied from peat-bogs belonging to the Corporation was £2 13s. 5d. per metric ton, delivered at the gas-works. Based on 56,000 c.ft. of gas per ton of peat, the net cost of the fuel worked out at 11·4d. per 1000 c.ft. of gas. This figure would, under ordinary conditions, be prohibitive for gas of poor quality; but, as the price of coke in Copenhagen is £9 4s. per ton, giving 130,000 c.ft. of gas at a fuel cost of 1s. 4½d. per 1000 c.ft., it is profitable to use peat at the present time. About 40 lbs. of good fluid tar are obtained from a ton of peat. The heating value of Dowson gas made from coke is only 128 B.Th.U. per c.ft. Compared with the pre-war price of coke, the cost of peat will have to fall considerably before it can be utilized on a commercial scale.

COMMERCIAL "CONCENTRATED AMMONIA LIQUOR" AND ITS IMPURITIES.

By HAROLD G. COLMAN, D.Sc., Ph.D., and E. W. YEOMAN, B.Sc., A.R.S.M., A.R.C.Sc.

In the "JOURNAL" for Dec. 10 [p. 567], there was summarized a paper presented by Dr. H. G. Colman and Mr. E. W. Yeoman to the London Section of the Society of Chemical Industry, in whose "Journal" the text of the paper has since appeared. In concluding our summary, we stated that the final portion of the paper explained in detail the methods of analysis employed by the authors in their investigations regarding "Commercial 'Concentrated Ammonia Liquor' and Its Impurities;" and this part is now reproduced in full.

ANALYTICAL METHODS.

The methods of analysis employed were in general those given by Linder [Alkali Inspector's reports], for the analysis of crude ammoniacal liquor, modified where necessary to allow for the much larger quantity of ammonia present in the concentrated liquor.

In these analyses, the greater part of the time required is taken up in filtration; precipitates, such as prussian blue and cuprous thiocyanate, being under ordinary conditions difficult to filter. The following procedure very greatly reduces the time required for filtration and washing, and is applicable with advantage in large numbers of cases, where difficult precipitates have to be filtered and washed, but have not subsequently to be dried and weighed, but are either to be rejected or treated with reagents to dissolve or decompose them.

The filtration is effected through filter-paper pulp which is readily prepared by shaking torn filter paper in a bottle with water until it is pulped. A layer of the wet pulp is then poured on to a perforated porcelain plate in a funnel connected to an evacuated filter-pump flask; and after the water has been extracted, the mass is gently pressed down with the finger. Occasionally, difficult precipitates, such as prussian blue, may run through the filter at first; and in such cases they are completely retained by using only a moderate vacuum at the beginning and passing the first filtrate through the same pulp a second time.

Hydrogen Sulphide.—This may be determined by Linder's method of precipitation with ammoniacal zinc chloride solution, and treatment of the zinc sulphide formed with hydrochloric acid and decinormal iodine. For the concentrated liquor, the following method was found more rapid: 10 c.c. of the sample is added to 50 c.c. of $N/10$ iodine solution mixed with more than enough hydrochloric acid to neutralize the whole of the ammonia, and the unused iodine titrated with $N/10$ thiosulphate and starch—the difference giving the iodine used. A further 10 c.c. is then treated with cadmium chloride to remove all hydrogen sulphide, and, after filtering through pulp, added to 10 c.c. of $N/10$ iodine and hydrochloric acid, titrating back with $N/10$ thiosulphate. The amount of iodine employed, which represents that taken up by substances other than hydrogen sulphide, is deducted from the amount of iodine found in the first test; the difference giving the number of c.c. of $N/10$ iodine corresponding to the H_2Sin 10 c.c. of the liquor (1 c.c. of $N/10$ iodine = 0·0017 gram. H_2S).

Carbonic Acid.—From 10 to 25 c.c. (according to the amount of CO_2 present) is run from a pipette into a hot solution of calcium chloride, avoiding as far as possible exposure to the air, from which the solution absorbs carbon dioxide. The beaker is covered and heated until the precipitated calcium carbonate granulates. This is then filtered and washed, the precipitated calcium carbonate dissolved in 25 c.c. of $N/1$ HCl; the unused hydrochloric acid being determined by titration with $N/1$ caustic soda, using methyl orange as indicator (1 c.c. of $N/1$ HCl = 0·0022 gram. of CO_2).

Phenols were determined by the iodine method given by Skirrow (J. Soc. Chem. Ind., 1908, 58) for the estimation of phenols in crude ammoniacal liquor.

Pyridine Bases.—These were ascertained by the method of Pennock and Morton (J. Amer. Chem. Soc., 1902, 24, 377).

Ammonium Thiosulphate.—An approximate estimation of this salt is obtained from the number of c.c. of iodine required by 10 c.c. of the liquor after treatment with cadmium chloride, as found in the estimation of hydrogen sulphide above. Each c.c. of iodine = 0·0148 gram. of $(NH_4)_2S_2O_3$. The results tend to be slightly high, owing to the other impurities, such as the thiocyanate and phenols, having some action on iodine.

Ammonium Cyanide.—The exact determination of the true amount of free ammonium cyanide actually present in a bulk of either crude or concentrated ammoniacal liquor is a matter of considerable difficulty. This arises, not from inexactitude of the analytical method, but on account of the rapid manner in which the cyanide undergoes conversion into thiocyanate by the action of the air during the taking of the samples, storing them, and handling them in carrying out the test. All figures of the amount of free cyanide in samples which have been in contact with air, or have stood for any length of time before analysis, merely give the amount of cyanide still remaining unchanged, which may be quite different from that of the bulk sample. For many purposes the total cyanogen content of the concentrated liquor is the chief information desired; and this change of cyanide into thiocyanate is unimportant, as any hydrocyanic acid not estimated as cyanide is found as thiocyanate. In these cases, therefore, the simplest plan is to add a few drops of ammonium polysulphide to the liquor taken for analysis to convert all cyanide into thiocyanate, and to omit the cyanide determination.

When, required, the following method of estimation of the cyanide has been found most suitable, but with all precautions it is very difficult to avoid some conversion of cyanide into thiocyanate: 100 c.c. of the concentrated liquor is taken—if possible, directly from the bulk to be analyzed; if not from a sample taken and preserved from contact with air as much as possible—and slowly run from the pipette into a flask containing about 150 to 200 c.c. of boiling water to which about 10 c.c. of $N/1$ caustic soda has been added. The water in the flask should have boiled for some minutes before the addition of the sample, so as to ensure the removal of all dissolved oxygen. When the bulk of the ammonia has been driven off, a solution of 5 grams of lead nitrate is added, and the mixture distilled for 20 to 25 minutes. The distillate is collected in water containing 25 c.c. of $N/1$ caustic soda; the end of the condenser dipping beneath the surface of the liquid in the receiver. All hydrocyanic acid present as ammonium cyanide is found in the distillate, which is titrated with $N/10$ silver nitrate in the usual manner, adding a little potassium iodide as indicator (1 c.c. $N/10$ $AgNo_3$ = 0·0054 grams HCN).*

Ammonium Ferrocyanide and Thiocyanate.—A few drops of ammonium polysulphide solution are added to 100 c.c. of the sample, till the solution shows permanently the yellow polysulphide colour, whereby any cyanide present is converted into thiocyanate. After standing about fifteen minutes, lead carbonate is added to remove hydrogen sulphide, and the filtrate boiled with addition of about 10 c.c. of $N/1$ caustic soda till most of the ammonia is driven off. The addition of a fixed alkali before boiling is necessary, as ammonium ferrocyanide loses part of its hydrocyanic acid when its solution is boiled. The previous removal of hydrogen sulphide is also necessary, as in presence of ammonium sulphide hot alkali causes a partial conversion of ferrocyanide into thiocyanate, thus rendering the results for the former too low and for the latter correspondingly high.

The solution is made slightly acid with sulphuric acid, and a solution of ferric alum added drop by drop till it shows the distinctive colour of ferric thiocyanate. The solution is then filtered through pulp, which retains the prussian blue formed from the ferrocyanide, and is washed with water containing some dissolved electrolyte—such as sodium or potassium sulphate. [Washing with distilled water often causes some colloidal prussian blue to pass through the filter.] The precipitate contains all the hydrocyanic acid present as ferrocyanide, and the filtrate all that is present as thiocyanate.

[With small amounts of ferrocyanide, it frequently happens that the colour of the ferric thiocyanate makes it difficult to see whether any prussian blue has been precipitated; but this shows up distinctly on the filter-paper pulp after washing. Filtration should be carried out in all cases, as even quantities of prussian blue that cannot be estimated, if left in, interfere with the end reaction in the subsequent titration of the filtrate for thiocyanate.]

About 10 c.c. of normal caustic soda is poured on to the filter pulp containing the prussian blue, which decomposes it, forming sodium ferrocyanide. This is washed out with water, the filtrate strongly acidified with sulphuric acid, and distilled according to the method of H. E. Williams (Soc. Chem. Ind., 1912, 468), with the addition of a little cuprous chloride, when all the hydrocyanic acid distils over, and is collected in water containing about 25 c.c. of $N/1$ caustic soda, as in the determination of the cyanide; the distillate being then similarly titrated with $N/10$ silver nitrate. Williams's method has been found by a large number of tests, made with pure ferrocyanides, to give very accurate results, provided that the cuprous chloride used does not contain material amounts of cupric salts. A convenient method is to use a 10 p.ct. solution of cuprous chloride in hydrochloric acid; some copper strips being kept in the bottle so as to maintain the whole in the cuprous state.

Ammonium Thiocyanate.—Two alternative methods may be employed for estimation of the thiocyanate in the filtrate from the prussian blue; the first being the quicker, but rather less accurate for an unpractised eye.

The first method consists in adding to the filtrate a further quantity of ferric alum, heating to 95°, and, after five minutes, cooling well, then adding dilute nitric acid (free from nitrous and hydrochloric acids), and titrating by Volhard's method with $N/10$ silver nitrate, until the red colour of the ferric thiocyanate disappears (1 c.c. of $N/10$ $AgNO_3$ = 0·0027 gram HCN or 0·0076 gram NH_4CNS). The solution in this case does not become colourless, but almost always retains a pink colour, due to the action of the ferric salts on the phenols present; and this makes the end-point of the titration rather less easy to decide. But with a little practice, there is no difficulty in ascertaining the point where the colour due to ferric thiocyanate disappears.

To obviate this difficulty entirely, the second method (which effects the removal of the phenols and other impurities present) is preferable until experience has been gained in the titration by the first method. This method must always be employed if chlorides are present. In it the filtrate from the prussian blue, which should be only slightly acid, is heated to boiling with the

* E. Linder has drawn our attention to the fact that, in boiling with caustic soda, some cyanide may be converted into thiocyanate by thiosulphate if this is present.

addition of more than sufficient sodium sulphite to reduce the whole of the ferric salt present to the ferrous state. If a large excess of ferric alum has been used for precipitation of the ferrocyanide, a correspondingly large amount of sulphite is required. Copper sulphate solution is then added in excess, and the precipitated cuprous thiocyanate filtered through pulp, washed, and the pulp and precipitate stirred with a hot solution of caustic soda or sodium carbonate (free from chlorides) and filtered. The addition of a few drops of ferric alum solution to the alkaline solution (forming ferric hydroxide) often facilitates the filtering and washing of the mixture through pulp. The well-cooled filtrate is then acidified with dilute nitric acid (free from nitrous and hydrochloric acids), ferric alum added as indicator, and the titration with *N*/10 silver nitrate made as before till the colour of the ferric thiocyanate disappears—the solution now becoming completely colourless.

If the amount of cyanide has been previously estimated, the amount found must be deducted from that found as thiocyanate, as this figure includes all hydrocyanic acid present as cyanide in the original sample, owing to the preliminary treatment specified with ammonium polysulphide.

Check Tests.

A number of check tests have been made by adding known amounts of ammonium cyanide, ferrocyanide, and thiocyanate to pure 25 p.ct. ammonia; small quantities of phenols being also added to the check solutions. In the absence of hydrogen sulphide, very accurate results are obtained in determining the hydrocyanic acid present in all three forms, and in the total amount present when tested in the manner specified above. But when hydrogen sulphide is present, although the total hydrocyanic acid present is found correctly, the amount present as cyanide is always found too low, and that as thiocyanate correspondingly high. The following two examples—one with, and one without hydrogen sulphide—exemplify the results obtained:

	(1) H_2S Absent.			(2) H_2S Present.	
	Taken.	Found.		Taken.	Found.
NH_3 (approx.) . . .	25·0		..	25·0	
HCN as NH_4CN . . .	0·0200	0·0200	..	0·200	0·0189
HCN as $(NH_4)_4FeCy_6$.	0·0440	0·0437	..	0·0440	0·0437
HCN as NH_4CNS . .	0·0306	0·0308	..	0 0306	0·0316
H_2S (approx.). . . .	nil			0·5	
Phenols (approx.) . .	0·2			0·2	
Total HCN	0·0946	0·0945	..	0·0946	0·0942

ESTIMATION OF SULPHUR IN SPENT OXIDE.

By Wm. Diamond.

The last issue of the "Journal of the Society of Chemical Industry" contains the text of the two papers on the subject of oxide used in gas purification—by Mr. G. Weyman and Mr. W. Diamond respectively—which were read at the November meeting of the Newcastle Section of the Society. The papers were summarized in the "Journal" for Dec. 3 [p. 523]; but opportunity is taken now of reproducing in full Mr. Diamond's paper, of which only a short abstract appeared on that occasion.

The estimation of the amount of sulphur present in spent oxide is customarily carried out by extraction with carbon bisulphide, and upon the figures obtained by this method are based the selling price of the oxide and also the calculation of the efficiency of working sulphuric acid chambers. It is obvious that the results obtained by this process of extraction are misleading, since the carbon bisulphide extracts from the spent oxide other impurities, including cyanogen compounds, ammonia, tar, and oil, all of which are weighed and returned as sulphur.

A method of removing the tarry matter from the oxide before extraction, by treatment with sulphuric acid, has been suggested; but this appears to be unsatisfactory in several respects. Particulars of a series of experiments on this method of acid treatment have been communicated to me. The results were as follows: Dried spent oxide was heated on a water bath overnight with sulphuric acid of various strengths, up to 40 p.ct.; the products were not satisfactory. When the pure acid (100 p.ct.) was used, the product was clean, but not entirely satisfactory; also it remained moist, and the subsequent extraction with carbon bisulphide was incomplete. The use of sulphuric acid containing 10 p.ct. of free SO_3 resulted in the production of sulphur of satisfactory colour. To obviate the difficulty due to the presence of free acid after this treatment, the most satisfactory procedure seems to be to moisten the material, add magnesium oxide, and dry before extraction.

It has been suggested that when oxide is treated with acid, high sulphur figures are obtained, owing to the decomposition of thiocyanates; but experiment showed that this was not the case. An attempt was also made to render the tarry matter insoluble by treatment with sulphur dioxide; but the material became so wet that the figures obtained on subsequent extraction with carbon bisulphide were very low.

Proposed Method.

According to Mendeléeff, sulphur is soluble in carbon bisulphide in practically all proportions, but is only slightly soluble in cold benzene. It occurred to me that by washing dry spent oxide with several portions of benzene, all the tar and oil would be extracted, leaving only the sulphur to be extracted by carbon bisulphide. I therefore had several samples treated in this manner. About 10 grams of the oxide are placed in an extraction thimble and nine successive portions of 20 c.c. of cold benzene are poured over the sample; each portion being allowed to filter through the oxide before adding a further portion. A number of tests showed that nine extractions allowed an ample margin. The whole extract is divided into two portions. The first is evaporated to dryness, and the residue weighed; the second is evaporated to dryness, boiled down with nitric acid, water is added, and the sulphur precipitated by barium chloride and weighed as barium sulphate. The first estimation gives the total tar, oil, and soluble sulphur compounds; the second represents the sulphur only. It is now necessary to extract the sulphur from the same sample with carbon bisulphide in a Soxhlet extraction apparatus as usual. The weighings will give: (1) Tar, oil, and organic matter soluble in benzene; (2) sulphur compounds soluble in benzene; (3) sulphur extracted by carbon bisulphide. In order that there should not be any dispute as to allocating the soluble sulphur, it is suggested that the proportion thus found be added to the sulphur found by extraction with carbon bisulphide.

In one test of a spent oxide, extraction with benzene gave residues of 14·18 and 13·37 p.ct. in duplicate tests; the amounts of sulphur found by weighing as barium sulphate were 9·17 and 8·22 p.ct. Thus the percentages of tar and other soluble matter were 5·01 and 5·14—average 5·07 p.ct. The amounts extracted by the carbon bisulphide from the original oxide were 49·87 and 49·79 p.ct.—average, 49·83 p.ct.; so that the actual sulphur content of the sample was 44·76 p.ct.

Industrial Fuel Conservation.

Industrial fuel conservation, writes Mr. H. E. Gilbert, in the "Southern Public Utilities Magazine," means first of all proper combustion. However many other desirable points there may be to consider, the main fact will be that, if proper combustion is not obtained and maintained, all other measures combined will not mean fuel conservation. For the purpose of securing complete combustion of the fuel, it is necessary not only that the correct amount of air and fuel be combined, but that this combination be accomplished at the correct time and place. Various systems of combustion for gas fuel have been developed within the last few years; and ample proof has been established to the effect that the need is systems of combustion rather than particular types of burners. It has been demonstrated that proper systems of combustion can and do maintain proper combustion, with ordinary care and attention; while even the best designed burners of particular types require constant and expert maintenance, as well as experienced operators, in order to maintain even fair conditions as to combustion. All gas men and industrial engineers should form in their own minds the impression that will lead them to approve, endorse, and advocate the systems of combustion that have been proved to be dependable in operation without expert maintenance. At the same time, they must lend their effort to establish in the minds of gas users the fact that proper combustion is the prime essential of conservation of gas fuel, and that where it is not immediately possible to instal such a system, it is at least possible to give special attention to the matter of combustion, so as to obtain the best practicable results with existing means until up-to-date equipment can be installed.

Dissolution of the Petrol Pool Board.—The Board of Trade have arranged with the companies who are parties to the agreement for the formation of the Pool Board (Petroleum Supplies), that the Pool will be dissolved as from the 31st inst. This will not, however, affect the powers of the Board of Trade to control prices of petroleum and petroleum products.

Temporary Increase of Charges Act.—The Board of Trade have made Orders under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, in favour of the West Cheshire Water Company, the Garw and Ogmore Gas Company, the South Suburban Gas Company, the Brading Harbour District Gas Company, the South Staffordshire Water-Works Company, the Gas Light and Coke Company, the Godstone District Gas Company, Ltd., the Dover Gas Company, the Sheppy Gas Company, the Stroud Water Company, the Aberdare and Aberaman Consumers' Gas Company, the Pembroke Docks and Town Gas Company, Ltd., the Westhoughton Consumers' Gas Company, the Conisbrough Gas Company, Ltd., and the Portsea Island Gas Light Company. Applications for Orders have been made to the Board by the Ascot District Gas and Electricity Company, the Longford District Gas Company, Ltd., and the Thurles Gas Company, Ltd. Orders have been made by the Local Government Board for the Chelmsford Corporation, increasing the maximum price from 3s. 9d. to 5s. 7½d. per 1000 c.ft. (with, as hitherto, an additional 9d. in certain parts of the area); and for the Doncaster Corporation, raising their price for gas from 3s. 6d. to 4s. per 1000 c.ft.

DUTCH ASSOCIATION OF GAS ENGINEERS.

Annual General Meeting.

The Forty-Sixth General Meeting of the Association of Gas Engineers of Holland was held on the 11th and 12th of July last, at Groningen. The following account of the proceedings is abstracted from a special number of "Het Gas," which contained the official shorthand writer's report.

The members were welcomed to Groningen at a reception by the Mayor, Dr. E. van Ketwich Verschuur, on the evening of Wednesday, July 10. The meeting itself was opened next morning by the Chairman, Dr. L. J. Terneden, of the Amsterdam gas undertaking, in the building "de Harmonie." The attendance list included one honorary member, 117 ordinary, and 34 associate members.

THE CHAIRMAN'S ADDRESS.

Dr. L. J. Terneden, in his inaugural address (of which what follows is but a brief paraphrase), referred to the absence of the President in the Dutch East Indies, and to the decease of the Vice-President. The Council had requested him to take the chair at the meeting. The Association deplored the loss by death in the course of the year of three members—George Wilson, of the Hague Gas-Meter Works; J. H. Franken, formerly of the Amsterdam and latterly of the Antwerp works of the Imperial Continental Gas Association; and J. van Rossum du Chattel, Engineer of the Amsterdam Corporation gas undertaking. The last named had been a member for 32 years, and had been most active on its Committees, Council, and in the presidential chair. He was Vice-President at the time of his death in April last.

A number of members of the Association were congratulated on having attained, in the course of the year, the term of twenty-five years' service in their official capacities, while Heer P. Bolsius received special congratulations on having been manager of gas-works for forty years, of which the last thirty years had been at Bois-le-Duc. Efforts had been made, with good results, to secure better remuneration for managers of Dutch gas-works, especially those of less than 105 million c.ft. per annum output. In March last, the Association petitioned the Minister for Home Affairs to take steps to create a lectureship in the "Technology of Coal and its Products" at the Technical College at Delft. Following the decision of last year's meeting, the Council approached the proprietors of gas-works for subscriptions in furtherance of the work of the Association, and the replies so far received had been very satisfactory. In view of the increasing expenses of the Association, the favourable response was gratifying, as was also the grant of 1000 florins made in 1917, and again in 1918, by the State Coal Distribution Department to the Coal Committee of the Association.

The official organ of the Association, the monthly journal "Het Gas"—now in its thirty-eighth year of issue—had been maintained, in spite of the difficulties of the time, latterly under the editorship of Heer J. H. Janson, the Manager of the Central Gas Bureau founded by the Association. With the return of normal times, it was hoped to make "Het Gas" a fortnightly or even weekly publication. The inception of gas managers' clubs in different parts of the country pointed to the desirability of meetings of the parent Association being held for the future more frequently than once a year. Schemes were also foreshadowed for the holding of fitters' examinations, for central coal testing, and for the foundation of a State Physical Laboratory.

In the works, sad changes had been forced by circumstances on the manager. The quality and quantity of the coal had been at fault, and while striving to maintain the quality of the gas supply, he had been impelled to lower it, and at the same time to ration consumers. For lack of gas coal he had had to carbonize steam coal, lignite, peat, and wood. Rationing had been in force since April 1 last, and the gas had been poor; but the gas-works had not closed-down. Not merely had the lack of gas coal been felt, but settings, conveyors, &c., needed renewal and repair, which could not be carried out for want of material. The supplies of coal, lignite, &c., had been obtained from the Dutch state and private workings, often at a great sacrifice. The Director of the State Coal Distribution Department had desired that it should be stated at the meeting how highly the Government and his Department appreciated all that the Dutch gas-works had done. The calorific power of the gas had dropped from the accepted 525 B.Th.U. to 420 B.Th.U. or less, and only by gigantic effort had the 200 or so Dutch gas-works, which had never before used anything but German and English gas coals, succeeded in maintaining uninterrupted supplies of gas. Nevertheless, the position was far from rosy; for, among other things, a goodly proportion of both the public and private lighting had in many districts had to be transferred from gas to electricity.

What would be the duty of the gas industry when normal conditions returned? Would it again make good gas of at least 525 B.Th.U., and coke, tar, and ammonia as the so-called bye-products, or would it be ready to supply gas of 420 B.Th.U. or less, an ideal coke with a minimum of breeze, a tar containing more benzol or toluol, or some other refined source of energy, and an output of ammonia large enough to enable the home land to dispense with other nitrogenous fertilizers? Was the total energy of the products obtained on gas-works to be a maximum proportion of the energy which time and the sun's heat had stored up in the coal, lignite, and peat? Should we cease to be mere gas manufacturers and concentrate our energies on making the utmost possible use of the coal, &c.? We could not say, at present, what would be the extent of the changes called for. But if we recalled the time not long past when gas-works had direct-fired settings and worked without exhausters, and viewed the changes effected by the introduction of through retorts, vertical retorts, and large chambers, and the increased yields of gas and bye-products and the alteration in their character, we should realize that, by different methods of working, the same coal could be made to give widely different resultant products. The carbon, hydrogen, and nitrogen, which seemed to be so listlessly associated in coal, could be resuscitated in groupings entirely different from those which resulted by old methods of carbonization.

It behoved them in Holland not to sit still. Chemical industry was advancing, and gas was, as it were, at the root of chemical industry. Two Dutchmen had succeeded in raising the content of benzol and toluol in coal tar to a figure previously unattained; while tests made at the South Gas-Works at Amsterdam had shown that the yield of ammonia could be increased by a modification of the process of carbonization. Owing, however, to changes in the supply of coal, these tests had not yet been carried to completion. These efforts indicated, however, that Holland was not content to depend on foreign initiative. But energy must be displayed if the Dutch gas industry was to retain its place of honour alongside that of other countries. Dutch gas men, old and young, must stand shoulder to shoulder for the advancement of their industry, their countrymen, and their native land.

PRIVATE BUSINESS.

The CHAIRMAN, at the conclusion of his address, formally declared the meeting open. He announced that the roll of the Association now comprised 7 honorary, 336 ordinary, and 133 associate members—a total of 476. Compliments were exchanged with local representatives, scrutineers were nominated, and the report on the position and work of the Association in 1917 and the accounts for that year were passed. The Treasurer presented a statement of the financial position for the ensuing year, which—thanks chiefly to donations from the State Coal Distribution Department and corporations—was very satisfactory. The salary of Heer J. H. Janson, who is both Secretary of the Central Gas Bureau and Editor of "Het Gas," was substantially increased. Nominations of President, Members of Council, &c., for the ensuing year were announced for ballot, and the question of the publication and price of the annual volume of statistics of Dutch Gas-Works was discussed.

A long discussion ensued as to whether the Association should participate officially in the annual congress at Utrecht. Ultimately it was decided that it should; detailed arrangements being left to the Council to settle.

BENZOL RECOVERY ON GAS-WORKS.

The CHAIRMAN then called upon Heer G. F. VAN LIMBORCH VAN DER MEERSCH, of Amsterdam, to read a paper entitled the "Recovery of Benzol by Washing on Gas-Works."

The author said that the recovery of benzol from coal gas, though long practised in other countries in connection with coke-ovens, was a novelty in Holland. Ordinarily, it would not be considered desirable to remove such an important contributor to its calorific value from the gas supplied by gas undertakings; but the Army Council, in its efforts to obtain volatile fuel for motor vehicles, had applied to the Amsterdam Gas-Works to know whether it would be possible to erect in a short time plant which would afford a considerable output of benzol. Study of foreign technical literature gave the impression that very costly and complicated apparatus was needed for the recovery of benzol from gas, and that large quantities of washing oil were required, as it would not absorb more than about 3 p.ct. of benzol.

It was decided to attempt continuous working with circulation of the oil, in order to reduce the quantity of oil needed to a minimum. The auther also decided to use an ordinary washer in place of the large washing towers generally described in connection with the process. Sundry pieces of apparatus were taken from the old cyanogen recovery plant, which was out of action, and there were available two Holmes's brush washers and three scrubbing towers from the ammonia plant. The intention was to absorb the ammonia in a scrubber, and the benzol in a washer immediately following it. The overflow from the washer runs into the usual collecting pit; and from this there is an overflow into a small underground storage tank, of about 220 gallons capacity. This tank is of small size, with the object of keeping the quantity of oil in circulation as low as possible. The oil collected in this tank is pumped through a preheater, which was at the first steam-heated, but is now heated by the effluent vapours. It is of great importance that the temperature of the inflowing saturated oil should be kept under close control. The oil then passes on to a Feldmann distilling column, which had been modified by the removal of the lime decomposing tank, and the placing of the limed-liquor column underneath, so that the oil traverses the whole of the long column, in which the benzol is driven off by the steam. The freed oil runs into an underground tank, from which it is pumped back to the washer, thereby completing the cycle of operations. The benzol and steam pass through the preheater and a condenser into an underground tank. The process is therefore very simple. All the oil needed is from 1300 to 1550 gallons in the washer, about 450 gallons in the two

tanks, and the small quantity in course of passage through the Feldmann column.

Originally, the train of apparatus included a centrifuge for separating water from the water-oil emulsion; but by increasing the temperature of the preheater, and jacketting the Feldmann column, the trouble caused by water in the oil has practically disappeared, and the plant has been simplified by the omission of the centrifugal separator. The water which is condensed with the benzol runs with it into an underground tank, from which the benzol and water are pumped off at different levels—the benzol into a storage tank, and the water into a separating funnel where traces of benzol separate out.

The size of the apparatus must obviously differ for different works; so that it would be of little service to quote the dimensions. The preheater, however, has about 160 sq. ft. of heating surface; the benzol condenser about 32 sq. ft.; the oil cooler about twice as much. The oil cooler was originally made with the same area of cooling service as the benzol condenser; but in practice this proved inadequate, and its size was doubled, though the benzol condenser proved amply large enough to condense the benzol and steam. In starting-up the plant the washer was turned and the oil run slowly in from the tank until filled. Then the gas was allowed to enter, and the washer kept going for about 12 hours without circulating the oil. The percentage of benzol in the oil was found to be 12 to 13 p.ct., which is considerably higher than the author has seen reported elsewhere. The circulation of the oil was then started, and in continuous working it attained a degree of saturation with benzol of 7 to 8 p.ct. The Feldmann apparatus and preheater were brought into operation in the ordinary way, and the complete cycle of working has continued from April 19, when it was started to the time of speaking (July 11).

Both pumps have the same stroke, and are driven by belts and pulleys of the same size from the engine of the washer. Since, however, the quantity of oil leaving the washer is greater, owing to the absorption of benzol, than that entering, it has been necessary to introduce a conical pulley in the drive of one of the pumps in order that the quantity of oil in the two tanks may be kept equal. At first, a man was detailed in each shift to look after the plant; but it was soon found that he had little to do. The plant had been erected in the washer and centrifuge buildings, and in the day-time it was placed under the charge of the foreman of the centrifugal tar separators, and at night under one of the engine men. The working is controlled by observation of the temperature of the oil and effluent benzol, made every hour. An electric signalling apparatus has been installed which rings a bell in the engine-room whenever the oil in either of the tanks falls below, or rises above, certain levels. In case of failure of the signalling apparatus. or of inattention to its warning, excess of oil in the tanks flows automatically into a large tank of 3300 gallons capacity.

Though the plant has run without interruption since April 19 last, it is only possible to give figures for the short period up to May 6, because on the 7th of May it became necessary to carbonize lignite, Limburg coal, &c.; and the yields have since been very variable. In the April 19 to May 6 period, 40,217,500 c.ft. of gas were passed through the plant, and 2750 gallons of benzol were recovered. This corresponds with about 0·068 gallon of benzol per 1000 c.ft. of gas, which appears a very low return. But it was not desired to effect complete extraction of the benzol. The Army Council required the gas-works to provide a certain quantity of benzol per annum; and the author's object was to extract no more than was needed to make up this quantity because it was desired to maintain as high as possible the calorific power of the gas. It may be mentioned, however, that in a corresponding period of eighteen days when, later, Dutch lignite and Limburg coal were being carbonized in varying proportions, tolerably complete extraction of benzol from the gas afforded an average yield of only three-fifths as much benzol per 1000 c.ft. as that mentioned above as obtained from the ordinary coal gas between April 19 and May 6.

The crude benzol distils in the following percentages by volume: 65° to 80° C., 1·5; 80° to 95° C., 66; 95° to 125° C., 9; 125° to 155° C., 7·5; 155° to 185° C., 7; and residue 9 p.ct. The residue consists chiefly of naphthalene. The 90 p.ct. benzol contains about 2·5 grams of carbon bisulphide per litre. When the ammonia scrubbers are not working efficiently, the water collected below the benzol contains about 0·4 p.ct. of ammonia.

For the time being, absorption of benzol for military purposes is urgent. It is not impossible, however, that, in peace time, if there is a change from the old high, to a lower, standard of calorific power, complete recovery of the benzol may be undertaken with a view to the supply of fuel for motor-cars and air-craft. It is merely a question of the relation of prices of motor fuel and heat-units in public gas supplies. The cost of the Amsterdam plant has been very low—viz., about £670, exclusive of the washer and Feldmann still, which were already on the works. Old material has been utilized as much as possible—*e.g.*, old boiler flues were used in making the tanks required.

This concluded the paper itself; but the author, in reply to questions, supplied the following additional information.

The 8 p.ct. saturation of the washing oil is attained in about six to seven hours. The oil is circulated through the apparatus at the rate of about 8 to 9 tons a day. The anthracene oil used should have 80 p.ct. distilling over between 200° and 300° C.. It is removed from the apparatus when the distillate falls below 70 p.ct. The whole of the oil is not changed at once—about half a ton is renewed each week. When benzol is wholly extracted from coal gas, the yield is about 30 oz. of benzol per 1000 c.ft. of gas. This corresponds with about 34,000 B.Th.U., which is small beside the enormous differences in calorific power which had been experienced (in Amsterdam) during May and June last. With the material now being carbonized, which yields only 6 to 7 oz. of benzol per 1000 c.ft., the reduction in calorific power due to its abstraction is only about 7 to 8 B.Th.U. per cubic foot. There is some loss of oil through spray carried forward by the gas; but most of this is recovered in the liquid pumped out of the next syphon-pot. The crude benzol yields on rectification about 53 p.ct. of 90 p.ct. benzol. The loss, chiefly unsaturated hydrocarbons, due to washing with acid, is about 13 p.ct. No price had yet been settled for the benzol supplied to the Army Council; but in discussing this point no consideration had been given to the fact that the consumer was receiving gas of considerably lower calorific power.

The Chairman expressed the thanks of the meeting to Heer G. F. van Limborch van der Meersch for his interesting paper, and then called upon Dr. Alph. Steger, Professor at the Hague, to give a lecture on "Old and New Methods of Producing Ammonia."

(To be continued.)

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

Meeting in Glasgow.

The second meeting of the session of the Scottish Junior Gas Association, Western District, was held in the Royal Technical College, Glasgow, on the 21st ult.—Mr. THOMAS G. MOFFAT (the President) in the chair.

CONSTRUCTIONAL WORK IN GAS-WORKS.

Mr. WM. A. WHITE (Dawsholm) read a paper, in which he gave a number of hints which young engineers might be likely to find useful when called upon to carry out alterations or extensions. The following are among the points which the author made.

FOUNDATIONS.

Where it is at all possible, all drainage work should be carried out first thing, thereby avoiding any interference or disturbance of the foundations after they have been finished. The question of depth of foundation is more or less an unknown quantity. If borings have been taken, then a very fair idea of the subsoil is obtained. It sometimes happens, however, that pockets or patches totally different to the bores are encountered, necessitating greater depth. The bearing resistance may be obtained by experiment. Take an iron bar of known sectional area and weight, and drop it from a known height. Note the depth of impression made on the soil, and deduct from the figures by the laws of falling bodies the resistance which has been offered according to the formula:

$$R = \frac{W \times H}{D}$$ where R = resistance with W = weight of bar.

H = height of drop in inches, and D = depth of impression.

From this you will get the resistance for the sectional area of the bar, and therefore the resistance per square foot. A factor of 8 should be allowed for safety.

Water is always a source of trouble in foundation work. If for any reason there is a delay in proceeding with the concrete work after the excavation is completed, it is well to let the water rise to its natural level—thus supporting the sides, and at the same time removing the danger of a subsidence in the bottom.

In laying out foundation work, it is well to remember that the base squared, *plus* the perpendicular squared, of a right angle triangle is equal to the hypothenuse squared, or it may be easier to remember the figures 3, 4, and 5, or multiples of them; 3 and 4 being the base and perpendicular respectively, and 5 the hypothenuse—*i.e.*, $3^2 + 4^2 = 5^2$. By this method, sufficient accuracy can be obtained for laying out the foundation; but when lining-off the building proper, the theodolite should certainly be used.

CONCRETE.

For making good concrete, a clean coarse material is required varying in size, clean sharp sand of varying coarseness, and the best portland cement. Brick which has been thoroughly cleaned of all mortar, whinstone, or steel slag, broken to pass through a 2½ in. mesh and to be retained on ¼ in. mesh, and used in the following proportions, I have found quite satisfactory:

—	Aggregate.	Sand.	Cement.
For ordinary work.	6	3	1
For walls or wet situations . .	4	2	1

In deep foundations, large stones or pieces of old concrete thoroughly cleaned and properly bedded can be used with safety, thereby economizing in material. Another point when making deep foundations is that the concrete should be tipped down a wooden shoot, so as to arrive gently at the bottom, and then be spread out in layers not exceeding 12 in. in depth. In wet foundations, the first 6 in. may with advantage be put in dry.

Where shuttering is required (say) for foundations above ground

level, or for openings in walls, always have the boards well limewashed. When this is done, you will find the shuttering coming away quite easily, and leaving a clean even surface. Occasionally in walls (say) of elevator pits, &c., a sort of sweating or slight leakage shows. I have found the application of two or three coats of "Ironite" has completely stopped this. The "Ironite" is mixed with water in small quantities, kept constantly stirred, and applied to the face of the concrete with a stiff brush, getting it well into the pores. The first coat is allowed to rust and thoroughly dry before applying the next. This method of application fills up the cavities in the concrete; chemical and mechanical union taking place between the "Ironite" and the surrounding surface. "Ironite" has been used for the inside coating of concrete purifier-boxes, making them gas-tight, with quite satisfactory results.

BRICKWORK.

The composition of the mortar is an important point; for, after all, the strength of your wall is the strength of your joint. I have found 1 lime to 3 of sand, or 1 cement and 4 of sand for ordinary work quite satisfactory. For coal-store walls or such like, the mortar should be strengthened to 1 lime and 2 sand or 1 cement to 3 sand. The question will often arise as to whether lime or cement mortar should be used. Cement mortar is the stronger and more costly; but personally I think that, for the comparatively little extra cost, it is preferable to use cement mortar. Lime mortar, however, which has more elasticity than cement mortar, is preferable for chimney work.

STRUCTURAL STEEL WORK.

The weak point in the erection of steel structure work is the bolts and rivets; and it is here that the greatest supervision is wanted. Frequently, holes may not come in just as true as one would like; and the workman, to save time and trouble, will substitute a bolt or rivet of smaller size; or it may be he has not for the moment at his hand the size required. Bolts and rivets should be the exact length required. Bolts should only be used where riveting is unsuitable, and, where used, after being screwed-up should be riveted over. The rivet when too short does not allow of it being properly snapped, the snapping tool cutting into the plate; and there is also danger of the rivet-hole not being properly filled, owing to the snapping tool striking the plate, and thereby taking up the pressure. When too long, again, a ring is formed around the rivet head. While this does not give a very nice appearance, it is to be preferred to a short rivet, since it ensures that the hole will be completely filled. Bad holding-up and bad snapping are also points to be watched. This can generally be seen by the rivet heads not being truly semi-spherical, or the centre of the heads not being in line. Where R. S. joists are used, tapered washers should always be inserted, to insure the bolt-head or the nut having an even bearing.

The punching of plates or bars always tends to "crystallize" the surrounding metal at this point, and permanently weakens it. Drilled holes are to be preferred. You have a perfectly true hole, against the tapered hole when the material is punched. To-day the practice in structural work is drilled holes; punched holes being a thing of the past.

With regard to riveting, hydraulic riveting is undoubtedly the best; but with pneumatic riveting, if the plates or bars are well drawn together with service bolts, the results are quite satisfactory. Pneumatic riveting for outside work has the advantage that the tools are lighter, and the pipe-line is more easily connected-up and much less trouble caused through leakage, since the pressures are not so great.

With regard to places where there is a large variation in temperature, like retort-benches, provision should always be made for expansion. Flooring plates, &c., should be kept clear of surrounding buildings or structures. In vertical retort work, where the superstructure is as a rule carried on R.S. joist columns, which at the same time act as bench buckstays, provision must be made to allow of the buckstays being adjusted to the requirements of the benches without disturbing the superstructure which is supported on them.

A proper record of cost should be kept—wages and material—and a summary made up (say) every week. This serves a double purpose; for it enables you both to keep a grip on the work and to get some exact data for future use and for checking your estimated cost. When this is done, you and your committee or directors will have the satisfaction of knowing that the work has been carried through in an economical and efficient manner.

DISCUSSION.

Mr. JOHN FRAZER (Dalmarnock), while agreeing with Mr. White's arguments as a whole, said there were one or two minor points on which he differed, particularly on the question of sand. A good deal depended on the nature of the sand. Three years ago he made a test of washing whin sand; and he found that with three to one of the rejected silt, as he might call it, he could make briquettes almost equal to the washed sand—showing that it was absurd to wash this silt out from whin sand, because it was clean and really in itself a cement. As to riveting, he was not a believer in either the nobble or the snap rivet. If a nobble was well put in, it was as good as a snap—in fact, it should be better. A good deal depended upon the heating of the rivet. If the rivet was furnace heated, then he agreed that the snap was superior; if it was hand heated, and the point was just warmed, then the nobble rivet was the better of the two. For good riveting, however, the hydraulic system was the best; but where other means were impracticable, the pneumatic tool was preferable. He appreciated the necessity in concrete work of leaving the faces rough, and never allowing too long an interval between the layers. In one particular job that he knew of, they had suffered from neglect of this. The weather had been bad, and the concrete was about ten days old, with the result that even to this day in the particular pit concerned there were signs of wetness.

Mr. JAMES DICKSON (Kirkintilloch) regretted that the author had not given them some information on the effects on constructional work of underground workings.

Mr. JOHN M'INTYRE (Glasgow) remarked that the weight of the man behind the pneumatic tool was a very important factor, and emphasized, from his experience in the Clyde shipbuilding yards, the value of introducing devices to increase the man's weight. He condemned the arbitrary system adopted by some workers in reinforcing concrete of throwing in old cast-iron piping, irrespective of the position in the mass which it occupied.

Mr. J. S. M'NICOL (Dawsholm), speaking in regard to lime, said he had noticed that when Irish lime for purification purposes was used in construction work, it had not the same adhesive preperties as Welsh lime.

The PRESIDENT said there was no doubt in the minds of engineers that hydraulic riveting was the best, though it was not always adaptable to the work on hand. With regard to drilling and punching holes, if they took the work of the boilermaker, Lloyd's allowed greater pressure if the holes had been drilled rather than punched. Drilled holes certainly were always best. The main points in riveting were the heating of the rivet, and the man behind it. He liked the point about the taper washer. Without it the rivets they got nowadays snapped off. Steel at present seemed to be all shell steel—made to snap. In gas-works, owing to the material they were getting, shafts which used to run for years were now only running months. With him they were breaking in a matter of two months. It was much the same thing all over—short-grain steel. He did not think that drilling and boring holes could be done at the same cost. Punching was very rapid. In regard to payment, so far as the gas departments were concerned, they were inclined to pay too little. The official idea was how much could be got out of the men, not how much could be given. But this would stop soon. The constructional paper of Mr. White was very good for the present time. So far as Glasgow was concerned, the proposal was on foot to disregard horizontals altogether and go in for vertical retorts. He hoped the managers of the various stations would have a say on the different kinds of verticals to be put down. There should be different verticals in all the works. so that they could arrive at what were the best. Throughout Britain they had dropped the British candle power standard and taken to heating value. What Glasgow was concerned about was not so much the calorific value of the gas, but the pressure. The people of Glasgow should have plenty of gas; but to get plenty there must be the plant to make it. Glasgow required to double its output.

Mr. WHITE replied shortly to the discussion.

A Back-Pressure Valve.

Referring to an accident at Ford City, Canada, mention of which is made in another paragraph of this issue, the "American Gas Engineering Journal" says that had the gas-mains in the town been equipped with the Connelly back-pressure valve (designed to prevent the return of gas through the meter into the gas-main) the explosions could not have taken place. In demonstrating the need for such a valve, a series of tests were made which proved the possibility of just such a mishap as was experienced at Ford City. The tests showed that air could escape back through a pipe delivering gas at a pressure of 3 in. It was found that, should this occur, the meter would reverse to the stop, and then allow the air to lift the valves, and thus enter the service-pipe to the mains. The patented valve alluded to is manufactured by the Connelly Iron Sponge and Governor Company, of New York, and is constructed with a ground metal-to-metal seat. Normally, the valve lies in a closed position, and requires the pressure of the gas to lift it from its seat. The reason for this is that, should there be no gas flow, the valve, due to gravity, will remain on its seat in a closed position, and thus prevent any seepage of air back beyond the valve. The adjustment is so sensitive that the slightest pressure will open it, with no loss in pressure or volume for the free passage of the gas.

Suspension of Proposed Tax on Benzol.—"The Times" stated on Saturday that, "following representations made by the National Council of the Commercial Motor Users' Association (Incorporated) to the Government, it has been notified by the Board of Customs and Excise that the contemplated imposition of a duty of 6d. a gallon on home-produced benzol, which tax was to have come into force last Wednesday, is suspended. It is expected that the C.M.U.A., acting in concert with its associated transport organizations of employers and labour, will succeed in securing the total withdrawal of the proposed tax on this important home-produced motor fuel."

Benzol Output of English Gas-Works.—Various figures are at times given for the output of benzol by the gas-works of this country. The figure has been put at 30 million gallons per annum by a good authority, says the "Commercial Motor." But the annual consumption of motor spirit, with the vast extension of the use of mechanical haulage, may be put in the immediate future at 180 to 200 million gallons. So that on the point of competitive value benzol is apt to fall short, and, doing so, is in danger of being absorbed in the meshes of the petrol distributing concerns or even of diminishing—the easier course being taken by gas companies of allowing the benzol to remain in the gas.

UNUSUAL CARBONIZING METHODS.

By JAMES A. BROWN.

[A Paper read before the Michigan Gas Association.]

During last year, the Michigan Light Company built new carbonizing plant at Flint, at Jackson, at Pontiac, and at Kalamazoo; and the Evansville Public Utilities Company, with whom the author is also connected, erected new carbonizing plant at Evansville (Indiana).

INCLINED OVENS AT FLINT AND EVANSVILLE.

The plant at Flint consists of 48 inclined ovens, with a carbonizing chamber holding approximately 5000 lbs. The carbonizing time is twelve hours. There have been a number of difficulties encountered in the operation of the plant. The design, at the time it was built, was new; and it would be rather extraordinary in such a case if some difficulties were not experienced.

The first trouble encountered was in the heating of the carbonizing chambers. In the original design, the combustion was localized in one flue on each side of each oven. Any stoppage in any one of these threw the distribution of heat out of balance, and caused the air and the producer gas to meet in the wrong place. This resulted in some damage to the bench, and, of course, in uneven heating. This difficulty has been entirely overcome.

Another difficulty encountered with this type of installation is the maintenance of the buck-bars and oven-mountings in proper condition to prevent all oven leakage. This has been very serious, and has not as yet been entirely got over. However, changes are being made at the present time which we feel sure will overcome the difficulty. On account of this leakage from the ovens, it has been impossible for us to properly study the furnace conditions on these benches; and therefore the producer efficiency is not as high as we expect to get it. Another difficulty has been the carrying over with the large volume of gas which is given off in a short time of lamp-black and tar, to such an extent that the collecting mains and foul mains have shown a tendency to become choked-up. This difficulty has been entirely overcome by properly saturating the gas through the installation of an adequate flushing and sprinkling system.

The first question that would be asked by one interested in the installation is, "How will the charges slip from the ovens?" When the charges are properly run, there is little or no difficulty with the sliding of them. A time study on these ovens shows that, when the charges are good, the average time for getting the coke out is 3·42 minutes; when they are fair, 6·6 minutes; and when the heats are poor, considerable difficulty is encountered and poking is necessary, and the average time it takes to get the coke out under this condition is 21 minutes. Whether or not the charge will stick depends a great deal on the kind of coal used. A coal which shrinks materially in the process of carbonizing would, of course, work out much better than a coal which does not so shrink.

The average temperature of the gas coming away from the installation is 175° Fahr. This is when the circulating and saturation system is in full operation. No attempt is made in the circulating system to cool the circulating liquor. The average temperature is considerably higher than this when the circulating system is not in full operation.

In the plant at Evansville, where the design of the ovens is similar to that at Flint, except in the heating flues, there has been no trouble whatever from sticking charges or leaky ovens. The coal used at Evansville comes from Western Kentucky; and the shrinkage is considerably more than when Pittsburgh or Eastern Kentucky coal is used. In Evansville, the coke almost invariably follows the door. The Evansville plant has been operating very successfully. This leads me to believe that, when the proper changes are made at Flint, the plant will be very successful as a carbonizing installation; and for a plant of this capacity—namely, 2,500,000 c.ft. per day—this design of oven will work out to advantage.

HORIZONTAL OVENS AT JACKSON, PONTIAC, AND KALAMAZOO.

At Jackson we have built a plant consisting of thirty carbonizing chambers, which hold a charge of about 4500 lbs. each; and they are run off in ten to twelve hours. The ovens are horizontal ovens, grouped three to each producer; and the heating arrangements are similar to those in the ordinary gas-bench. This type of plant, of course, demands the use of a heavy pusher. Some difficulties have also been encountered in the operation of this plant; the principal one of which is the overheating of the gas before it gets away from the oven. This has been overcome to a considerable degree by the installation of sprays and saturators, but still remains more or less of a problem.

Another difficulty is the doors and coke-baffles which hold the charge away from the doors. A satisfactory design of baffle has not yet been arrived at. New ones are being tried; and there are hopes that this problem will soon be solved. Steel baffles oxidize rapidly; and cast-iron baffles, when light enough to be handled, are fragile.

The results obtained from the plant at Jackson are, on the whole, very fair. The yield is good; and the bench-fuel used is low. The labour needed to operate is not as low as expected; but we attribute this more to the difficulty of keeping trained men on the job than to the work.

At the plant of the Michigan Light Company at Pontiac there have been installed fifteen ovens similar (except in size) to those at Jackson. The charge for each of these ovens is 2600 lbs. No trouble is experienced here with the off-coming gas—principally due to the extensive recirculating and saturation system. The yield of gas from these ovens has averaged about 5½ c.ft. per pound; and the bench-fuel is low. The distribution of heat is excellent. The labour cost is low; but on account of operating these benches with other retort-benches, it is not as low as we expect it to be. The principal difficulty with this plant is with the doors and baffles, as described in the Jackson plant. One would naturally inquire why it would not be better to instal a plant with short ovens, as at Pontiac, rather than long ovens as at Jackson. It would, however, require the installation of about 100 of these ovens to equal the capacity of the 48 ovens at Flint.

The Michigan Light Company at Kalamazoo are just putting into operation a horizontal carbonizing plant in which the size of the charge is 8000 lbs.. The scheme of heating is such that we do not anticipate any trouble whatever from the off-coming gases. The principal difficulty expected with this plant is with the doors and baffles; but we have now in mind a design of door that can readily be used with our machinery on this plant, which will get us entirely away from this trouble should it develop. The principal objection to the type of plant at Kalamazoo for the size of installation there, which is 1,250,000 c.ft. capacity per day, is the heavy machinery required; and if the plant is to be kept in continuous operation, a duplication of the machinery is necessary, and also very expensive.

CONCLUSIONS.

It is now, as always, impossible to more than generalize on the type of plant suitable for any size installation. It is proving, however, very difficult to obtain the necessary help to work the old style hand-operated retort plants. Men no longer choose the stoker trade. Additions to plants along these lines will, therefore, be avoided.

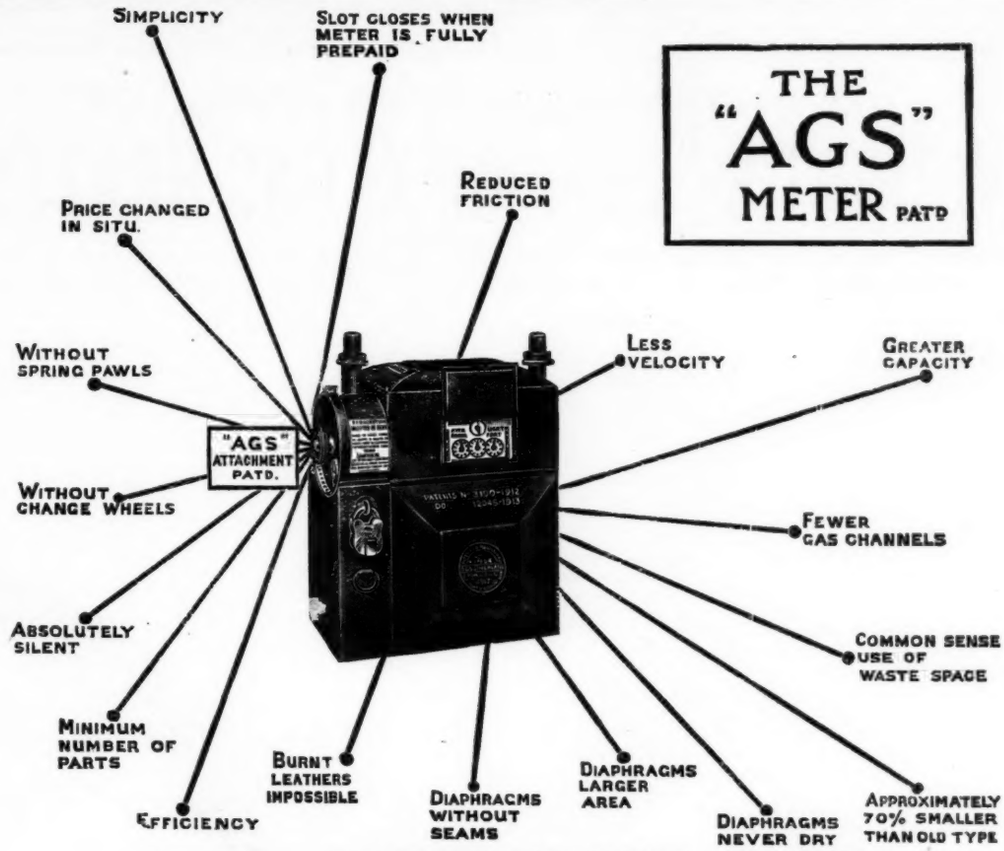
The results obtained from the plants with large charges are such that for a medium-sized installation we would select, if possible, a plant where large charges were used; but when such a plant is installed, it is also necessary to instal machinery for handling the coal into the overhead bin, and for handling the rather large charge of coke away from the retort. This will require more extensive apparatus than would be needed for handling the smaller charges from a retort plant; and for this reason, in order to keep the investment down, in the small plant through retorts with a hand-operated or mechanically operated pusher will be found economical, and will do away with the hottest part of the stoker's job. This sort of installation should be carefully considered for small plants.

In plants above 500,000 c.ft. capacity, it is the author's opinion that horizontal ovens should be considered; the length of oven to be determined by the capacity required. No economy in labour will be obtained in a small plant with large ovens over the same plant with small ovens, as expensive and cumbersome machinery must be installed. It requires a certain gang to carry on the operation of charging and discharging, and this gang might as well be kept busy.

The installation of an oven plant of any kind means the provision of coal and coke handling machinery, and once installed, this requires a different organization. Arrangements must be made for a duplication of the machinery, or at least for many duplicate parts. Trained men must be employed to maintain and repair it; and it is machinery different from that the men ordinarily encounter. Unless prepared to arrange for due maintenance, do not get the machinery, as it will certainly prove a disappointment.

Meter Explosions and their Cause.

A series of somewhat unusual explosions occurring within consumers' meters and in house-piping at Ford City, Canada, is stated to have been caused by an air mixture which got into the line from a compressor in a rivet furnace installation near by. The explosions all took place within a distance of some 2000 feet. Mr. C. A. Schwarin, of Detroit, was called in to investigate the matter; and in his report he explains that a rivet-heating furnace using compressed air and gas, in the works of the Dominion Forge and Stamping Company, was so connected that compresed air from a storage tank ordinarily carrying 10 lbs. pressure was used as the air blast; and this air was proved conclusively to have found its way into the factory gas-pipes and through the meter to the service-pipe supplying the plant, and then on to the Gas Company's mains. The gas and air pipes were tied together just above the burner, and connected so that the gas and air were mixed there. When all the points had been elucidated, Mr. Schwarin said the cause of the various explosions could be traced directly to the fact that with a low or almost zero gas pressure existing in the mains, and with air feeding into the gas-mains, a combination of air and gas was produced within the mains; and this mixture was carried into the consumers' premises. When brought into contact with a flame or with wood and coal fires which had been kindled in the ranges of some of the premises, the explosive mixture backfired or exploded within the burners, through the house-piping, and extended into the meter, exploding there because of the weak structure of the meter, and because of the meter containing a larger quantity of the explosive mixture than the house-piping. Explosions occurred in only those premises where conditions were most favourable.



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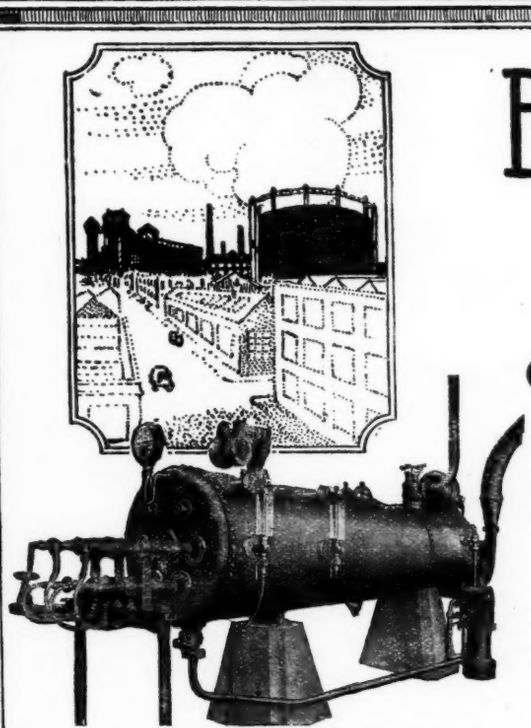

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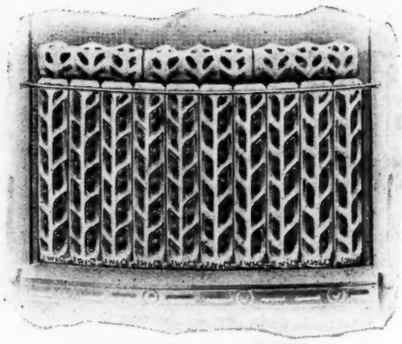

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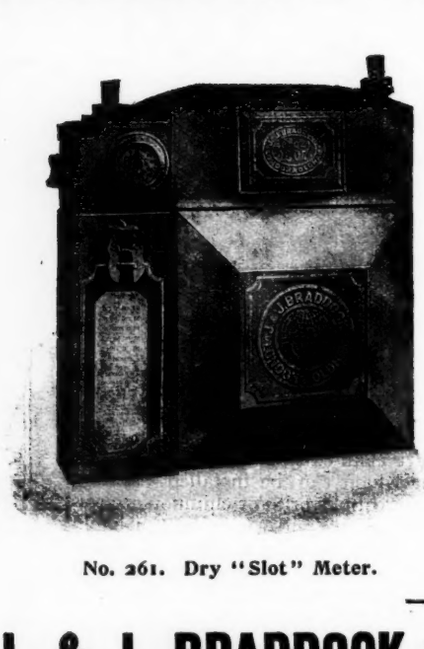

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CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Liquid Fuels and Low-Temperature Carbonization.

SIR,—In your very able and well-written Review of 1918, published in the last number of the "JOURNAL," under the heading of "Oils, Liquid Fuels, and Low-Temperature Carbonization," you make points about low-temperature people "having shifted their former ground," that "they always evaded questions of time and economy," and that the low-temperature people "were filled with chagrin" (and a few more taunting remarks) because they found that the ordinary vertical retort could produce as good, if not better, results in obtaining oils, &c., than by means of specially-designed plants.

You point out the achievements of the Mineral Oil Production Department with the plant at the Radford Gas-Works of the Nottingham Corporation. Perhaps you will go a little further and verify all this by publishing the actually ascertained results, and whether they are commensurate with the powerful Government machinery which has been brought to bear on the question, and with the very considerable expenses incurred by the Ministry of Oil Production during its four years or more of installation. If they obtained the oils as you state "in day-to-day working," the Department will, I feel sure, through the medium of the "JOURNAL," be only too delighted to render an account of its stewardship, and justify the expenditure of a very considerable sum of public money.

A little bird whispered to me that the combined efforts of the Department did not succeed in supplying the needs of one oil-burning torpedo boat, and that the oil was of a very poor and mongrel quality. On inquiring the total cost per gallon—which, of course, included the Department's standing charges—my little bird mournfully chirruped "Titwillow," and fell off its perch!

F. D. MARSHALL.

19, *Queen Anne's Chambers, S.W.*,
Jan. 1, 1919.

REGISTER OF PATENTS.

Separating Thorium from Other Rare Earths and for the Manufacture of Thorium Nitrate.

No. 120,748.

CLARKE, J. V., of Plumstead, Kent, and CLARKE, W. A., of Cornhill, E.C.

No. 13,617; Sept. 21, 1917.

This invention consists, broadly, in effecting the separation of thorium from acid solutions containing thorium and other rare earth metals by the addition to the acid solution of a reagent which will give a precipitate directly soluble in acid. The invention further consists of a process by which thorium nitrate or other salt of thorium is obtained from monazite sand by subjecting the sand to the usual breaking process with sulphuric acid and then treating with water to give a solution of rare earth phosphates in sulphuric acid, and subsequently precipitating thorium peroxide by means of an oxydizing agent, and finally dissolving it in nitric or other acid to produce the nitrate or other salt.

An example of the carrying out of this process is as follows: 20 grams of monazite sand are digested with 50 grams of concentrated sulphuric acid at a temperature of approximately 180° to 200° C., until the resultant pasty mass is soluble in water, with the exception of the unattacked portion of the mineral, which is chiefly composed of compounds of silicon, zirconium, and the like. This operation usually takes about two hours. The pasty mass is then slowly added to 200 ccm. of water at normal temperature, and allowed to stand for some time—preferably over night—to allow the insoluble matter to settle. The solution is then decanted or syphoned off, and a slight excess of a weak solution of sodium or potassium permanganate is added—the quantity required being determined by the occurrence of a permanent discoloration of the liquid. The solution is next gently heated to about 90° C., when the thorium is precipitated as an oxide, or more probably a mixture of oxides and peroxides. [Great care must be taken in this operation not to raise the temperature too rapidly, or a gelatinous precipitate will be formed which is very difficult to separate and wash.] The precipitate is then filtered, and washed free from cerium and acid. The wash water is best tested by litmus (not ammonium molybdate in acid solution), for there is usually a trace of sulphuric acid after washing free from phosphoric acid. This precipitate is soluble in nitric acid; and to obtain the nitrate it is dissolved in nitric acid, preferably about a 50 p.ct. solution. The thorium nitrate can be crystallized out in the usual way; but it is preferred to evaporate the solution down to crystallizing point *in vacuo*.

Recovery and Utilization of Cyanides Contained in the Bye-Products Obtained in Gas-Works.

No. 120,759.

BAKER, H., of Barrow-in-Furness.

No. 16,879; Nov. 16, 1917.

This invention has for its object the recovery of cyanides from spent oxide of iron and also from the waste or effluent liquor obtained from ammonia recovery plants, and the ultimate decomposition of the cyanides produced or obtained (1) by partial decomposition while in the liquid condition, and (2) by the total decomposition when in the solid or precipitated condition.

The patentee's specification is as follows: I take the waste or effluent liquor from ammonia recovery plants and boil to a concentrated condition more or less, and then add a further quantity of sodium or potassium carbonate and continue to boil. Now, under this condition, the more easily decomposed cyanides and thiocyanates are decomposed into ammonia, which should be recovered.

The whole of the process may be carried out in one stage, (1) by adding the required quantity of sodium or potassium carbonate to the ammoniacal liquor in the first place, and boiling-down to concentration (more or less) to make sure that the easily decomposed cynides have been decomposed into ammonia; or (2) by adding sodium or potassium carbonate to such an extent as would drive off the ordinary fixed ammonia obtained by the everyday methods of recovering ammonia from gas liquor, and then either boiling-down to concentration more or less and then adding a further quantity of sodium or potassium carbonate; or (3) by adding the further quantity of alkali—that is, after the ordinary fixed ammonia has been evolved—at this stage in the process, and then boiling-down to concentration more or less. In this way, a further quantity of ammonia is obtained by the partial decomposition of certain cyanides and thiocyanates while in the liquid condition. This partial decomposition of the cyanides may be brought about in this way also.

After the ammonia has been evolved from ammoniacal liquor in the usual manner by the use of lime, I add a further quantity of sodium or potassium carbonate (soda ash)—that is to say, the soda ash is added at a point in the plant below that at which the ammonia has been evolved from the crude ammoniacal liquor by the everyday method of using lime only. The liquid is then boiled to concentration, more or less, when a further quantity of ammonia is evolved, owing to the before-mentioned decomposition of certain cyanides. When lime has been used in the first place, and sodium or potassium carbonate added afterwards, I obtain a precipitate of calcium carbonate which may be drawn off if required; but I prefer to leave any lime sediment or precipitated carbonate in the liquid, as this is beneficial (but not absolutely necessary) in the operation of total decomposition to be described later on.

The liquid should at this stage—that is, after this boiling and concentration—be of a deep blood-red colour, rich in undecomposed sulphocyanides (thiocyanates). I then add metallic compounds (other than compounds of mercury) for the precipitation of the remaining cyanides and sulphocyanides; or I may store this liquid, and use it over and over again in place of lime or other alkali for the recovery of the ordinary fixed ammonia from ammoniacal liquor—taking care to add more sodium or potassium carbonate each time it is used, or in the last stages of the distillation, so as to cause the decomposition of the more easily decomposed cyanides by the methods already described. In this way, I obtain a strong and saturated solution of alkalies and sulphocyanides (or sediment alkalies and sulphocyanides), which should be worked-up from time to time into insoluble sulphocyanides by the addition of some metallic compounds.

Now bearing in mind that the waste liquor thus obtained by any of the processes mentioned is very rich in alkali as well as sulphocyanide, the liquid will still be rich in alkali when the cyanides have been precipitated. I may draw the liquid off, and wash the precipitated cyanides free from alkali, and use the washing waters or mother liquor over again for dissolving the metallic compounds used in the precipitation of the cyanides; or I may use the washing waters or mother liquor for liberating ammonia from ammoniacal liquor in the first place or mixed with more concentrated waste liquor as before described, and use it for the purpose of liberating ammonia from ammoniacal liquor as described. In this way, a complete cycle of operations is obtained. Alternatively, I may evaporate to dryness or concentrate to crystallization the alkaline liquid containing the precipitated cyanides—thus producing a natural mixture of alkalies and cyanides. In precipitating the cyanides, the solution of metallic compounds, or the compound itself, may be added to the prepared waste liquor, or the liquor obtained from spent oxide hereafter described. When the liquors are in the hot or cold state, the action of precipitation takes place practically at the same rate in either case. I prefer to add the metallic compounds, either in the liquid or solid condition, when the solutions are cold, and when chemical action has taken place gradually warm-up to boiling. In this way frothing is prevented, and the precipitated cyanides settle much quicker after boiling, or being boiled, than they do if precipitated and settled entirely in the cold.

I treat spent oxide in this way: The sulphur is first extracted by any suitable means; and then I wash or boil the material with sodium or potassium carbonate, and allow to settle after any evolved ammonia has been recovered. I draw off the clear liquid; boil down to concentration more or less—recovering any ammonia evolved; and precipitate the cyanides contained in it by adding any suitable metallic compounds other than mercury compounds. I take the precipitated cyanides, and prepare them (if so desired) in the manner before described, and then decompose them in the manner hereafter described. The sulphur may be recovered from the spent oxide after the cyanides have been removed if it is so desired.

DECOMPOSITION OF THE CYANIDES PRODUCED.

I take the insoluble cyanides produced by any of the methods mentioned—that is, washed free from alkali or mixed with alkali—and I roast, burn, or carbonize them in apparatus with or without air, adding a further quantity of sodium or potassium carbonate if I so desire. If without air, I obtain ammonia, which should be recovered in any suitable manner; and I have left in the retort the sulphide of the metallic compounds used in the precipitation of the cyanides in the first place which sulphide may be re-roasted in a current of air or oxygen in the same apparatus, so as to decompose the metallic sulphide into oxide, and generate sulphur dioxide, which may be used in the manufacture of sulphuric acid or employed for other purposes. Or the sulphide may be treated with acids to decompose it into sulphuretted hydrogen and produce a solution which, after neutralization, may be used again in the precipitation of the cyanides—the sulphuretted hydrogen being collected and recovered by any known means. If the cyanides are treated in the presence of air, I obtain ammonia and sulphur dioxide, which should be recovered; and I have left in the retort the oxide corresponding to the metallic compound used in the precipitation of the cyanides in the first place, which oxide may be

used again in precipitating the cyanides or used in the purification of coal gas. I notice that, on decomposing the cyanides in the presence of air, the ammonia is evolved first, and the sulphur dioxide last, or in the last stages of the decomposition. Therefore it is quite possible to recover these gases separately. In this way, I may treat the cyanides and sulphocyanides obtained as described in patents Nos. 110,819 and 112,329.

Gas-Meters.—No. 120,937.

TIPPER, G. E., of Doveridge, near Derby, and SEAL, S., of Darfield, Yorks.

No. 10,603 of 1917; Jan. 24, 1918.

This invention relates to dry meters provided with detachable diaphragm chambers; and it has for its primary object the interchangeability of the diaphragm chambers to either side of the meter by the provision of a particular construction of the gas connection between the valve ports and the diaphragm chambers.

Tipper and Seal's Dry Gas-Meter.

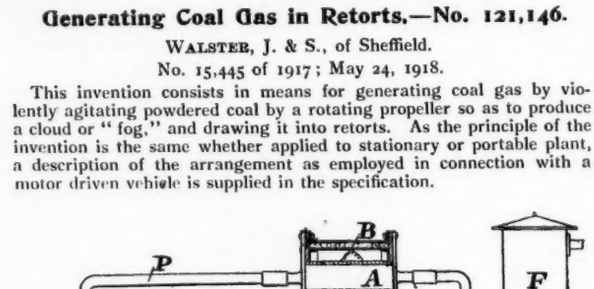
The two measuring chambers A are separated (as usual) by a vertical partition B. Under the valve ports C, and abutting the outlet channels D, is the gas connection F between the port and the diaphragm chambers. The connection is of sufficient length and of such construction as to allow the union I on it to be fixed equidistant from both the sides of the meter and also the diaphragm chamber. The union connecting the gas-channel F and a diaphragm chamber A is an ordinary cone gas union. The connection F is of such construction as to allow the union I to be fixed as described, which enables the diaphragm chambers to be used on either side of the meter.

Generating Coal Gas in Retorts.—No. 121,146.

WALSTER, J. & S., of Sheffield.

No. 15,445 of 1917; May 24, 1918.

This invention consists in means for generating coal gas by violently agitating powdered coal by a rotating propeller so as to produce a cloud or "fog," and drawing it into retorts. As the principle of the invention is the same whether applied to stationary or portable plant, a description of the arrangement as employed in connection with a motor driven vehicle is supplied in the specification.



Walster's Gas-Generating Plant.

A diagrammatic representation of the plant when electrically heated is given; also a sectional elevation of the retort when heated by gas-burners.

The agitating device referred to consists of a chamber L, in the lower portion of which is mounted a propeller or agitator M, having two or more blades. The chamber L contains a horizontal perforated diaphragm O; and from the top a pipe P is connected to the feeding end of the retort A, of refractory material. Surrounding the walls of the retort are electrical resistances B, which, in the case of a motor vehicle, are supplied with current from storage batteries or from a dynamo. Outside the resistances is placed an insulating cover with lagging enveloping, which is a rigid casing. To the outlet end of the retort a pipe leads to a purifier F and a storage reservoir (or to an internal combustion engine).

In the alternative form of construction shown, under the retort are rows of gas-burners; and as the retort is enveloped in a casing of non-conducting material, the heated gases pass upward between the casing and the retort (thus heating the upper parts of the latter), and are drawn away to an exhaust outlet I.

Manufacturing Sulphate of Ammonia.—No. 121,082.

LINDER, S. E., of Buckhurst Hill, Essex.

No. 9130; June 3, 1918.

According to this invention, a small proportion of ammonium carbonate in the solid state or in solution in sufficient water merely to moisten the sulphate of ammonia (or partly in the solid state and partly in solution in sufficient water merely to moisten the sulphate of ammonia) is added to the sulphate of ammonia to effect the neutralization of the free sulphuric acid contained in it. The admixture may be effected in a closed mixer provided with mechanical means for agitating its contents; and the treatment may be effected at, or somewhat above, the atmospheric temperature, in order to permit the chemical reactions to take place.

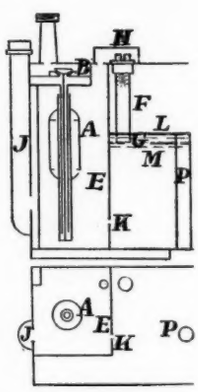
Thus, for example, in treating sulphate of ammonia containing 2 p.ct. of moisture and 0·5 p.ct. of free sulphuric acid, a proportion of ammonium carbonate slightly greater than 0·5 p.ct. by weight of the sulphate to be treated is added to, and mixed with, the sulphate of ammonia. But when the ammonium carbonate is added in the form of a solution, the proportion of water is such that it is completely taken up by the mass of sulphate.

Gas-Meters.—No. 121,252.

THOMPSON, W. E., of Liverpool.

No. 8678; May 25, 1918.

This invention relates to the "certain and emphatic" closing of the valve of a wet meter so that it is not possible for it to be affected by the height of the water level.



Thompson's Wet Gas-Meter.

In the arrangement shown, the float A, with the valve B attached to it by a wire which slides through a long seal tube, is fitted in a separate chamber E, which has a vent formed by a pipe F. This pipe is adjustable in height—one end G being sealed by the high water L, but at low water M the end of the pipe is open to the gas above the water. The opposite end of the vent pipe is screwed into a nut or bush, so that it may be elevated or lowered to the exact position to allow the bottom end to be free of the water at the low-water line. A connection H is made between the top end of the vent pipe and the float chamber. J is a water charging pipe and K an orifice from the float chamber E into the front box.

When water is poured into the charging pipe, it passes into the float chamber, and the orifice K being much smaller than the charging pipe, the water rises high in the float chamber and expels the air or gas from the chamber, through the tube F, into the front box. At the same time water is passing through the orifice K until the high-water line in the front box (as denoted by the overflow P) is reached, and the bottom end of the tube F is closed.

The float chamber is now full of water, and the float has lifted the valve off its seating. The meter is thus free to work; and as the gas passes through, evaporation of the water in the meter takes place, and the water level is slowly lowered. The vent pipe, however, remains sealed; thus holding-up the water in the float chamber until the water level falls to 3 p.ct. slow, when it leaves the bottom end of the vent pipe open. The gas then passes up the vent pipe and allows the water in the float chamber to descend quickly—taking with it the float and valve—until the valve reaches its seating and shuts off the gas. The valve is so adjusted as to close before the water reaches its low level. Thus the float is left suspended from the valve, adding additional weight to it and holding it quite closed until more water is poured in, when the whole action is repeated.

Edinburgh Gas-Workers' Committee.—A Sub-Committee of the Edinburgh and Leith Gas Commissioners met recently a deputation of ten of their workmen, for the purpose of considering the formation of an Employees' Committee to meet representatives of the Commissioners, as and when required, for the purpose of discussing conditions of work and other questions arising, in the manner recommended by the Whitley reports. It was agreed, on the motion of the Provost of Leith, that the Sub-Committee should recommend the appointment of a Committee of five members of the Gas Commissioners to meet a like number of representatives of the Workmen's Committee; it being understood that the arrangement was to be a provisional one, pending the setting-up of a permanent Committee under the Whitley scheme, and the preparation of a model constitution soon to be formulated by the National Joint Industrial Council. At their meeting on the 30th ult., the Commissioners approved the recommendation.

MISCELLANEOUS NEWS.

THE SOUTH SUBURBAN GAS COMPANY AND THEIR CO-PARTNERSHIP SCHEME.

A Development in the Control of Labour Conditions.

A meeting between the Directors and employees of the South Suburban Gas Company took place at the Livesey Hall, Sydenham, on Friday, the 13th ult., under the presidency of Mr. CHARLES HUNT, M.Inst.C.E., the Chairman of the Company, supported by other members of the Board, and the chief officers.

The CHAIRMAN, in opening the proceedings, said that when he had the pleasure of meeting the co-partners some weeks before, he was able to tell them that the news had arrived in London that day of the complete surrender of Bulgaria; and he ventured to suggest that it was the beginning of the end. He was sure that no one could even then have foreseen that the end (or practically the end) would come so quickly as it had done. The total defeat of the enemy forces—and he might say the freedom of the world—had been accomplished by a great expenditure, unfortunately, of both blood and treasure; and he thought they had all felt, as the war proceeded, that things were not going to be just the same as they were in the past, when the war was ended. The war had given them all wider views; and he hoped it had enlarged their sympathies. Whatever their sphere or position, all were, he was sure, desirous, if possible, of making things better than they had been; and this was the object of their present meeting. When he was asked some two or three years ago, whether the reconstruction which everybody looked forward to at the end of the war would be effected on co-partnership lines, he had no difficulty in answering that so far as their Company were concerned it certainly would. They were now met in fulfilment of this pledge—in fulfilment of the promise. He could say a great deal on what co-partnership could do for employees more than it had hitherto done. However, they had been asked to meet and hear what had been decided by the Co-Partnership Committee in regard to the alteration of rules, so as to make co-partnership even more than it had been in the past—a real charter for the employees. He would not go into details because the Secretary of the Sub-Committee, Mr. Carter, had been kind enough to undertake to address the meeting and explain fully how the whole thing had been brought about. But he might just say it was the aim and desire of the Directors that the proposals they had put forward should be thoroughly successful; and in order that they might be successful the Directors wanted the co-operation of all concerned. Everything which anyone felt he had a right to complain about should by all means be brought before the Committee, and they would judge as to what should be done with regard to it. The Board also wanted the co-operation of the co-partners as shareholders in the undertaking. Parliament was last year good enough to grant the Company a small addition to what they would have been entitled to at the present price of gas. The co-partners were directly interested in this, because the higher the dividend paid, the better the return for all their investments. He was sure no one would feel satisfied when the stock for which £100 or £120 had probably been paid went down to about £70. The Directors were anxious to get an adequate return for the capital, just as the workers were anxious to get an adequate return for their labour. Both were deserving of consideration, and both, he hoped, would get it—the men as representing Labour as well as Capital and the Directors as representing Capital. He did not think he need say more than this, but would ask Mr. Carter to explain fully the alterations which were now proposed.

Mr. CHARLES J. CARTER (Secretary of the Sub-Committee of the Co-Partnership Committee) said: I welcome this opportunity of giving a full explanation to you of the causes which have led to calling this meeting, and for putting a resolution which will be submitted to you for your decision later this afternoon. Many of you no doubt are aware that lately there have been several meetings of the Workmen's Section of the Co-Partnership Committee. Some have remarked, and some have complained that you have not been put in full possession of information as to the progress and nature of the business we have been concerned with. Well, I must say this business has been of a somewhat difficult and delicate nature, and could not have been adequately conveyed to you by ordinary conversational means in the course of two or three minutes' conversation. It was impossible, we felt, in these circumstances to make you fully conversant with the matters that have been considered.

The causes for the appointment of the Sub-Committee were threefold. In the first place, those of you who have read the daily papers must have been aware that, for a considerable time, there has been a certain amount of labour unrest throughout the country. Organized workers have in some cases not been content with endeavouring to obtain increases of wages in some degree commensurate with the increased cost of living, but have advanced extreme claims, and taken extreme action by exploiting the position which has existed. These demands have been made by men on munitions and other work. I say that they have in some cases exploited the situation—putting forward extreme demands, which in ordinary peace and normal times would never be contemplated. An instance of this might be quoted in a strike to compel other men to join a Union such as took place at a gas company's works a short time back. I may say, too, that co-partnership in some cases has not protected companies from action of this sort. At the time when this occurred, or very shortly afterwards, the managing officials of our Company heard rumours that you men here contemplated taking some action of the kind.

Needless to say, your representatives promptly met and approached the managing official and assured him that there was no foundation whatever for the rumours which had reached them. But it so happened that just at that juncture an incident occurred (the details of which I need hardly refer to) which was calculated to cause a certain amount of disquiet in the mind of our Chairman, Mr. Hunt. The upshot of it was the appointment of a Sub-Committee to consider the general question of labour unrest and strikes; and I may say that we representatives, I believe, convinced our Chairman and the Directors as to the loyalty of you co-partners here.

There was another matter mentioned at the Co-Partnership Committee meeting. This was the report which I think I explained to you at the last meeting called here a short time back. The Government appointed a Committee to inquire into the relations between employers and employed—the Committee called the Whitley Committee. They issued a series of reports in which they advocated, or recommended, for the purpose of avoiding disputes between Capital and Labour, the setting-up of Joint Councils or Committees, National and Local, for the government of each industry and the settlement of any matter which might result in a breach of the peace of the industry. Moreover, the Committee were to consider by what means production could be increased, and the success of the various industries assured. These Councils were to be constituted in well-organized industries on the sole basis of the Trade Union representative on the part of the workmen and representatives of Employers' organizations on the other side. Then Works Committees were to be set up, on practically the same lines, to deal with similar matters as concerning individual undertakings.

The question then arose as to how this would affect co-partnership. There was the question to which I have already referred in general terms—the doubt as to trade unionism, and co-partnership, and the Whitley report. We referred them to a Sub-Committee of the Co-Partnership Committee, consisting of the whole of your representatives. The Sub-Committee held five sittings and two conferences—one conference with the Chairman, Mr. Shoubridge, and Mr. Gorman, present; while a portion of the Sub-Committee met Mr. Shoubridge and Mr. Gorman in order to deal with certain grievances which had been reported.

I am not going to inflict the whole of the reports on you; but I may say we issued two reports and supplementary reports, dealing with the questions before us and the alteration of rules. Part of the first report states that certain grievances which had been reported to the Committee have been debated, and the Committee decided to approach the management with reference to them. I may say that, in the conference we had with Mr. Shoubridge and Mr. Gorman, every individual grievance that we brought up and discussed was settled satisfactorily for the workman concerned.

To refer back to the Co-Partnership Committee (although we are convinced that the Chairman and Directors realized that our men are loyal and contemplate no such action as had been rumoured), we had to admit that there had been rather rapid progress in organization among the men, considerable numbers of whom had joined the Union. And at the same time we had also to admit—as had been obvious for a very long while—that the men generally had manifested very little interest in the working of the Co-Partnership Committee. This was evidenced in lack of interest in the elections of co-partnership representatives, and also in the details of the business to which the Committee confines itself. I suggested that it would possibly stimulate the men's interest in the Committee if the Committee were made the medium for discussing more vital matters than that of the "Approved Society," the accident fund, and all other parts of our co-partnership system. That is to say, what they consider more vital than these, the conditions under which they work.

I have given you our first report. Our second report concerns the Whitley report, and we passed a resolution to the following effect:

> "Whilst recognizing in the recommendations of the Whitley Committee a great advance on existing methods of settling general conditions, adjusting points of difference, and thus avoiding disputes, we desire to express extreme regret that the Committee refrained from making any recommendations with regard to co-partnership undertakings, and also that the Ministry of Labour in compiling particulars of existing forms of Works Committees, failed to publish evidence which must have been available to them, of the work of Co-Partnership Committees of the gas industry, in harmonizing relations between employers and employees."

We follow that with this:

> "We are of opinion that our Co-Partnership Committee can be adapted to carry out the functions of Works Committees more harmoniously and conveniently than any other form of Committee which excludes the special relations existing in co-partnership."

Then follow a number of suggestions which I will deal with when I come to the amendment of the rules. These suggestions have been put forward and are all accepted by the Directors, and we are forced to make the necessary alterations and amendments to our rules. In regard to trade unions and co-partnership, I come to the following part of our report:

> "In view of possible difficulties in future, we consider it desirable to ascertain the attitude of trade unions to co-partnership, and express the opinion that a co-partnership company which recognizes established trade union conditions in its dealings with employees, and in addition makes provision for a share in the profits and a voice in the management, is entitled to a guarantee that such undertaking should be exempt from the operation of any general or sympathetic strike."

Our further meetings were occupied in drafting proposed amendments to the rules. A very important—in fact, I think the most important—alteration is that referring to Rule 7. At the end of the rule, we add two new paragraphs:

> "A Permanent Sub-Committee shall be formed, consisting of the whole of the elected representatives, to discuss and make recommendations on any matter affecting the interests of the employee co-partners, or other subjects concerning the co-partnership system which may be authorized by the Co-Partnership Committee. Such Sub-Committee shall be empowered to elect its own Chairman and Secretary and to arrange its meetings as occasion requires. Any decisions on committee business to be subject to approval of the Co-Partnership Committee."

I may say we have considered the desirability of informal meetings of the workmen's section by themselves. This idea came from the Chairman himself, who proposed that our Sub-Committee—composed of you co-partners—should be regularized by rule, and clearly authorized to deal with questions in regard to all matters with which you may like to entrust us—your conditions of employment (not only pay), treatment, and other questions. I take it that our Committee may develop in other directions. Any matter affecting the health, comfort, and general wellbeing of the workers in the works can also be considered by the Sub-Committee. It is for us to develop whatever comes under the word "welfare." I say that this, in my view, is one of the most important alterations which have been made; and we must give our Chairman his due when I say that this proposal came directly from him and not from us.

The other paragraph deals with the duties of your representatives in the matter of dealing with your grievances and other difficulties. Of course, we have always recognized that this has been part of our duty; but there has been no rule in our system which has really authorized us to carry out duties in that direction, which we have previously undertaken. This other paragraph states that:

> "The elected co-partners' representatives shall have the right to make representations to the managing officials on any grievance, individual or general, or other matters affecting the interests of the co-partners in their respective departments. And, in the event of failure to obtain a satisfactory adjustment, they shall be empowered to appeal to the Chairman of the Company. If agreement is not then attained, the matter shall be referred to the Committee, whose decision shall be in the form of a recommendation to the Board of Management, or to the employees concerned."

The amendments are making machinery which will be speedy and effective. The provision here with regard to the appeal to the Committee is good. Of course, we all know that possibly in the case of a private individual—between one or two representatives and an official and the Chairman of the representatives—they might fail to make a good case. In cases of this sort, where a satisfactory adjustment has not been reached, this rule provides that the Chairman of the Company should be asked to confer with the whole Committee. Thus it is assuring the fullest possible chance of any grievance being rectified. Another very important alteration consists of the amendment of Rule 16. At present the Co-Partnership Committee is bound to meet "twice in each year." In future, the full Co-Partnership Committee will meet "once in each quarter;" and we have added at the end of the rule:

> "The Chairman shall announce to the Committee any proposed changes in wages, hours, or other conditions of labour; and the Committee shall be entitled to discuss the same, and any problem arising therefrom. But any decision on such matters shall have regard to arrangements entered into for the gas industry."

You will understand by this that there will in future be a free discussion of any proposed changes in the matters referred to; and as you are asked to accept our Committee as a Works Committee, in substitution of a Whitley Works Committee, you will know we have safeguarded your position by voluntarily pledging the Committee not to accept less favourable conditions for you than would be obtained by any other means.

Now, my fellow co-partners, I want to say this: We have been actuated by a desire, which has been fully supported by our Chairman and Directors, to give you machinery superior to any other devised for the settlement of grievances, and to show that under our co-partnership system these matters can be adjusted fully to your satisfaction. The Chairman said this should be a "Happy New Year," and one that shall see the fresh development of our co-partnership system. Let us hope that with mutual confidence and sympathetic administration on the one hand, and loyal and intelligent co-operation on your part, the result will be increased prosperity, and the certainty that our Company will meet the strenuous times which are ahead of us, and come out in a better position than the Company has ever occupied before. And may it also show that our co-partnership system has justified itself as a system which not only promotes harmony of relationships among employers and employed, but offers to us conditions that impel us to aim at increased production and also makes the prosperity of our Company the aim of each one of us. As you know, Mr. Lloyd George said the other day that, if attention could be drawn to a system assuring increased production (which we think co-partnership does assure), he would do his utmost, as Prime Minister, to advance such a cause.

Mr. ANSETT, Chairman of the Sub-Committee, moved the following resolution: "This meeting of employee co-partners hereby agrees to accept the Co-Partnership Committee as a Works Committee for the purpose of adjusting any matter affecting our interests as employees, in preference to any other form of committee, and pledges itself to adopt no other means for the settlement of any matter at issue until the whole machinery of our co-partnership system has been utilized without satisfactory result."

Mr. M. INGHAM said he had listened with interest to what Mr. Carter had placed before the meeting; and he had great pleasure in seconding the resolution.

The CHAIRMAN said that, the resolution having been moved and seconded, if any co-partner wished to say anything upon it, now was the time to do so.

Mr. CHARLES CARPENTER, D.Sc., remarked that he did not expect to have been called upon to attend the meeting; but he must say he had been on few occasions so delighted as when listening to Mr. Carter's admirable and lucid speech in setting-out the objects of the meeting. With regard to the Board as a whole, it required very little converting (if any) to the views so admirably enunciated by Mr. Carter. In co-partnership there was a magnificent machine, which had been existing at the works for something like a quarter of a century; but perhaps they did not all realize that the machine was capable of doing much more effective work than it had been doing up to the present time. Now it was only right to say that one could not expect all movements for the benefit of the undertaking to come from the Board. They did their best, but could not do everything. Instead of the matter coming from the Board, what had culminated that day was a movement that originated from the workmen themselves—to use the magnificent machine that was set up by the late Sir George Livesey, and use it to much better effect in the future than in the past. He (the speaker) felt that with the machinery set up, and the altered rules, there was no reason in the world why every man employed by the Company should not only be a well-paid man—by well paid, he meant wages which various organizations in different parts of the country paid—but would receive first of all his wages (a thing he could get everywhere) and then, what he could not get everywhere, be treated as a human being. This co-partnership would provide. What did it matter what one got in wages unless he could live a happy and contented life; unless he felt he could go through life treated honourably and fairly by all—and particularly by those whom fortune had put in command. Everyone whose lot in life had been to work under men placed above them knew how very keenly rankled in the heart any injustice or semblance of injustice. He had some recollections of this sort of thing himself; and the one thing men wanted, and were proud of—it seemed innate in one's nature—was that they should be treated fairly. It did not matter how firm a man was, so long as he was fair. It must be remembered, too, that a man did not mind how firmly he was treated, provided he got fair play and justice. What no one liked was to be treated with injustice. There were bound to be occasions when one grievance or another would occur. What was wanted was, not that the grievances should rankle and fester and become open wounds, but that there should be some machinery ready to do the healing work at once; and this the co-partnership system would do. What it was essential should be realized was that the only way in which the future of this country could be assured would be by finding some method by which employer and employed might work together in harmonious relationship. All the sacrifice made in the recent war would be thrown away unless such an end was achieved. He was sure it would be brought about here; and he spoke for the Board when he said that their thanks were doubly due to Mr. Carter and the members of the Committee who had taken up so successfully this problem and put the machine in order. Their thanks were very much due to them; and he was equally certain those present would have every reason to be thankful that when they selected their representatives, they elected some "tiptop" representatives—men of sound common sense. To them they all owed a great deal for the way in which they had faced the problem presented to them, and fairly and logically put their case to the Board of Directors. In conclusion, he might say: "Not only you, but you and many who will come after you, your sons too, will have reason to thank the members of the Committee who have so surely added utility to that grand machine which Sir George Livesey supplied us with a quarter of a century ago."

Mr. W. G. WALLER said all would agree that they owed a debt of gratitude for what the Co-Partnership Committee had done. The reason it appealed to them was that everything was so fair. There was no "You-will-have-to-do-this-or-that" about it. Sir George Livesey developed the scheme of co-partnership on such broad lines that it was standing the test to-day. He (Mr. Waller) was one of those—curiosities, perhaps—who had looked into ancient history, but had failed to find anything to compare with co-partnership. Never since the time of Adam had there been a scheme like this; and he did hope that all would pull in the same direction to make the scheme a success in the future as it had been in the past.

The CHAIRMAN put the resolution to the meeting and, having taken a show of hands, declared it carried.

Mr. INGHAM proposed a vote of thanks to Messrs. Ansett and Carter and the Sub-Committee for formulating the alterations to the rules.

The CHAIRMAN seconded the motion, and it was carried.

Mr. ANSETT thanked them all for so hearty a vote of thanks, and was sure the Committee would do their best in the interests of the men and the Company.

Tea having been served, the Chairman thanked all present for their attendance and wished them a very pleasant Christmas and a very happy New Year.

WAR MEMORIAL.

Mr. ANSETT, addressing the Chairman, said that at a previous Committee meeting a suggestion was made that a War Memorial should be instituted to those of the Company's men who had fallen in the war; and he took the opportunity of seeing whether those present would agree to a mutual undertaking. In that event, each man would be asked to subscribe something, so that it would be from all, from the highest to the lowest.

The CHAIRMAN pointed out that the proposed memorial was to be a mutual affair, in mutual recognition of the obligation all were under to those who had borne the burden of the great war. A design was in preparation for it; and as soon as anything was fairly settled, it would be exhibited for approval or otherwise. It was the intention that all should have an opportunity of seeing it and criticizing it.

Mr. CARTER proposed a vote of thanks to the Chairman, Directors, and Officers of the Company, not only for being present, but for co-operating with the workpeople in trying to make the scheme they had formulated the success it was hoped it would be.

Mr. ROYLE had much pleasure in seconding the proposal, which was carried.

The CHAIRMAN, replying on behalf of his colleagues and himself, assured those present that their hearts were in their work and they were exceedingly anxious it should prove a thorough success. He was sure it would be a success, so long as the support which had manifested itself that afternoon continued, and he saw no reason why it should not.

The proceedings then terminated.

Similar meetings were also held at Bromley and St. Mary Cray—presided over by the Chairman—at both of which the resolution proposed by Mr. Ansett was unanimously approved, and the utmost good feeling towards the Company was expressed.

BELFAST GAS UNDERTAKING.

Price and Quality.

Dealing with the Belfast gas supply during 1918, the "Northern Whig" newspaper says that the close of the year "finds the price of gas higher than it has been for the last 34 years, and the quality worse than it has ever been in the history of gas making in Belfast." Both of these conditions, it is admitted, are unavoidable—the enormous cost of coal and oil, the raw materials of gas-making, being inevitably reflected in the cost of production; while the Board of Trade regulations have rendered it illegal to produce gas of first-rate quality. There were two increases of price during the year—one in May, the other in September. The nominal price now is 3s. 9d. per 1000 c.ft., and for power 3s. 4d. Both rates are subject to 20 p.ct. discount for cash within a month. The pre-war price was 2s. 3d. and 1s. 10d., less 20 p.ct. discount; "and people were then nursing hopes that, with the installation of improved appliances, the net price would ere long be down to 1s. per 1000 c.ft."

It is mentioned that, notwithstanding the public lighting restrictions and attempted private economies, the output from the gas-works continued up to a few weeks ago to show a steady increase. This was due partly to the increased utilization of gas for cooking and heating purposes, and partly to the inferior, and still declining, quality of the gas produced in recent times, necessitating a larger quantity than formerly to produce equal results. Since early-closing orders were enforced recently, with a view to the saving of coal, the gas output, instead of a 5 or 6 p.ct. increase, has shown a similar percentage of decrease as compared with a year ago.

A feature of the gas accounts to which attention is particularly directed is "the serious reduction in recent years of the proportion of coal-cost which is returned in revenue from bye-products of residuals in connection with coal-gas production." On this matter the "Whig" says: In 1909-10 the amount received for coal-gas residuals was 92 p.ct. of the works cost of coal carbonized; in 1912-13, the proportion was 94·6 p.ct.; in 1914-15, it suddenly dropped to 67·3 p.ct. In 1915-16, the percentage rose again to 77·1; in 1916-17, it fell again to 63·3; and in the year ended last March, it barely touched 60. This is a serious matter, for it seems to indicate that the new method of manufacture, while establishing a record in the amount of gas produced per ton of coal, involves a loss in residuals which more than counterbalances the gain. Of course, the question of prices bears on the matter; but it seems only reasonable to assume that the prices of coal-gas residuals—coke especially, which is by far the most important—would rise proportionately with the price of gas. There was £22,000 worth of coke used in the manufacture of water gas last year; and the total sales of coke realized £113,161. But look at the percentage of value of the coke in relation to the cost of coal as compared with former years. In 1912-13, the net amount (less labour and cartage) received for coke was 70·5 p.ct. of the works cost of the coal carbonized. In 1915-16, the percentage had fallen to 54·8; and last year it was only 48. This shows either a great differentiation in the amount of coke produced per ton of coal carbonized or an equally remarkable differentiation in the comparative prices of coal and coke.

SHEFFIELD AND COKE-OVEN GAS.

A Reply by the Company.

As portions of an article headed "More Gas for Sheffield—Belated Adoption of University Professor's Suggestion," which appeared in the "Sheffield Daily Telegraph," were reproduced in last week's "JOURNAL" [p. 718], it is only fair that the reply of the Gas Company, through the columns of our contemporary, to the criticisms made should also be reprinted in our pages. This reply was in the form of the following letter signed by Colonel H. K. Stephenson, the Chairman of the Company.

Sir,—My attention has been called to an article under the heading: "More Gas for Sheffield; Belated Adoption of University Professor's Suggestion." By a strange coincidence, this article, which constitutes a somewhat malevolent attack on the Sheffield Gas Company, is matched in the same issue by an article "puffing" the City Electric Supply Department. The latter is quite welcome to the gratuitous advertisement, so far as the Gas Company is concerned. Gas and electricity both have their respective parts to play in the world; and attempts to put the two Sheffield undertakings in opposition to each other, and to create bad feeling between them, appear to be singularly out of season. If, however, the article devoted to "puffing" the Electric Supply Department is no more accurate in its facts than the one attacking the Company, the public are more likely to be misled than enlightened.

The inability of the Gas Company to cope with the greatly increased demand for gas during the latter half of 1917 was due to causes entirely outside the Company's control. It may be supposed that everyone is now aware that during the later stages of the war no material, either for repairs or extensions of the gas-works, could be obtained except under priority certificates issued by the Ministry of Munitions. Under the grade of priority issued to the Company (P. 5's and P. 4's), the contractors could not deliver the material to the Company quickly enough. It was not till the late spring of the present year that the Ministry realized that the "priorities" issued were useless for the purpose of war supplies, and issued slightly higher priorities; but it was then too late, and plant ordered a year ago is even now undelivered. The fault, therefore, did not rest with the Company.

Your information as regards the taking of coke-oven gas by the Company apparently leaves much to be desired. The Company had no power under its Acts of Parliament at the date you name to take coke-oven gas; and when it applied in the autumn of 1916 for such powers, the granting of them was opposed by the Sheffield Corporation, representing the citizens of Sheffield. As a result of this opposition, a limitation was imposed that coke-oven gas should not be used for lighting. The Corporation similarly opposed the clauses in the Bill asking for powers to raise capital for the purchase of land on which to build additional works in order to increase the supply of gas for Sheffield. The Company had eventually to get part of its powers for the supply of coke-oven gas by Provisional Order from the Board of Trade, which was only confirmed by Parliament in November.

Not a moment was lost by the Company; but coke-oven gas, before it could be turned into the mains, required the laying of pipes to convey it, the erecting of purifiers to purify it, and of gasholders to contain it, material for which had to be obtained under such priority as the Ministry of Munitions would give. In this particular matter, contractors more than once broke their promises. The mains were laid as the pipes were received; and within a few hours of the last pipes being laid, the Company were utilizing the supply.

With regard to the installation of coke-ovens at one of the Birmingham gas-works, as a part of the supply for that city, this installation was put in many years ago, but has never been added to.

The Sheffield Gas Company has a brilliant record, having for years past, including the greater part of the period covered by the war, given to the community a bountiful supply, not only of the best gas, but also, if the small works at Widnes are excepted, of the cheapest gas in the country.

At the present moment, Sheffield is receiving an adequate supply of good quality gas of a calorific value of 500 B.Th.U., though the Board of Trade, in a letter dated Dec. 17, 1918, to local authorities throughout the country, recognizing the difficulties under which gas undertakings are being conducted, state that, in their opinion, "the general interests will be best served if they (local authorities) will refrain for the present from taking proceedings against any of the gas undertakings in respect of deficiencies of calorific power so long as the calorific power does not fall below 450 B.Th.U., and so long as the proportion of inert constituents in the gas is not excessive." From this it would appear that, so far from Sheffield being singularly unfortunate in its gas supply, it is very much the reverse as compared with the rest of the country.

H. K. STEPHENSON.

Banner Cross Hall, Sheffield, Dec. 23, 1918.

To the letter was appended a note by the Editor denying that one article was an attack upon the Gas Company or that the other was a "puff" of the Electricity Department.

GAS TRACTION DEVELOPMENTS.

In connection with the British Scientific Products Exhibition which is being held in Manchester, an address, from which the following are extracts, was given yesterday by Mr. E. S. SHRAPNELL-SMITH, C.B.E., Deputy Director of Technical Investigations in H.M. Petroleum Executive, and Secretary of the Inter-Departmental Committee on Gas Traction.

ONLY A TEMPORARY SET-BACK.

The case of gas traction has not been inherently prejudiced by the war-time difficulties of 1918. Accumulated experiences at the hands of holders of gas permits have completely endorsed the original estimate that 250 c.ft. of stripped gas—*i.e.*, debenzolized gas—is the normal equivalent of a gallon of petrol. This result can certainly be attained, with reasonable care and supervision, with any town gas of which the heat value is not less than 460 B.Th.U. per c.ft. If special precautions be taken to avoid loss by leakage, and to maintain a proper combustible mixture throughout the range of varying load on the engine on the road, the same equivalent can be maintained even with gas of which the heat value may temporarily fall appreciably below this specification. It may be mentioned, incidentally, that for the time being gas undertakings are permitted by the Government to supply gas down to 450 B.Th.U. per c.ft., notwithstanding the higher peace-time standard which is laid down in the various Acts that control this particular standard of public supply.

GAS SOON TO BE PLENTIFUL.

There are at the moment 3600 gas permits in force in the whole country; and of these fully one-half are effective in the North. The requirement for gas permits ceases on Friday next, the 10th inst., after which date gas can be used for gas traction purposes by anybody who can obtain it; and in this connection I have an important announcement to make, with the concurrence of the Coal Controller, Sir Guy Calthrop. It is in the following terms: "The only restriction that need be placed on the supply of gas for traction purposes is the ability or inability of the gas undertakings to supply the gas. It may reasonably be assumed that the position *re* supplies will actually improve from now onwards."

FLEXIBLE CONTAINERS.

Practically all the new records during the year 1918 concern the utilization of gas which is carried on the vehicle in flexible containers. Loss by leakage has been reduced, as compared with the experiences of 1917, by reason of two principal improvements; the newer fabrics are generally manufactured to comply with the specification which is given in the interim report of the Gas Traction Committee; and methods of attachment are such that frictional wear on the container is reduced, and local tearing practically avoided.

SEMI-RIGID CONTAINERS.

Nothing has occurred during the year 1918 to cause the Gas Traction Committee to vary the unanimous view to which they gave expression in the interim report of April last. This reference was in the following terms: "It is undesirable that semi-rigid containers of rubber and canvas or other proofed fabric should at present be allowed to be charged with gas to a pressure greater than 90 lbs. on the sq. in., or should be of a larger internal diameter than 4 in.; and even with these limitations containers of this class are, in the opinion of the Committee, unsafe if not properly armoured with galvanized steel wire of 0·012 in. diameter (No. 30 B.W.G.)."

The prospects are more hopeful where the semi-rigid containers are made of an inner rubber member protected by an outer casing of steel

wire. This class of container would appear to offer not inconsiderable possibilities for the convenient provision of a limited supply in houses which are not in the area of any gas-supply system and gas-works, to the end that the advantages of having gas for certain domestic heating and lighting purposes of a temporary character shall be rendered available. If gas undertakings generally will give attention to this new branch of consumption, I feel convinced that many of them will succeed quickly in putting it on a commercial basis, and in relieving the dependence of residents in rural districts upon candles and oil. A container of this type might easily meet the indicated requirements for a period of a fortnight or more; while the total weight involved is considerably less than for any ordinary cylinder. Such a scheme promises to have an important bearing upon gas-traction developments, in that it will provide an additional load for any compressing plant which gas undertakings may decide to instal, and thus reduce the compression costs.

Metal Containers.

The future of gas traction depends very largely upon the development and adoption of equipments which embody metal cylinders as the containing vessels. It is not open to me to anticipate the findings of the Gas Traction Committee; but I am authorized by its Chairman (Sir Boverton Redwood, Bart., Director of Technical Investigations in H.M. Petroleum Executive) to forecast that the final report of the Committee will urge the wide adoption of other and lighter cylinders than those which were imposed in 1896 by the findings of the Home Office Committee on the manufacture of compressed gas cylinders.

Portable Generators.

One of the most striking developments during 1918 has been the evolution and employment in service of a satisfactory portable generator on the suction-gas principle. Here, again, I am not at liberty to anticipate the findings of the Gas Traction Committee; but I am authorized to forecast that the final report of the Committee, which it is hoped to publish a few months hence, will direct public attention to the new economic possibilities which attach to the widespread use of such portable generators working on the suction-gas principle. The Gas Traction Committee are co-operating with the War Office to conduct further tests with such a system; and I have the utmost confidence in predicting a general commercial application in the near future. The average consumption of anthracite per mile run, with a 3-ton load, on give-and-take roads, is less than 2·5 lbs., which, at 46s. 8d. per ton—a high figure—is equivalent to petrol at 5d. per gallon, and town gas at 1s. 8d. per 1000 c.ft., purely on a fuel-comparison basis, and without endeavouring to equate convenience, capital outlay, or cost of maintenance, as to which the future alone can furnish precise figures.

Calorific Values and Power Yields.

The power yield of any gas in internal combustion engines does not depend upon the heat value of the gas, but upon the heat value of a combustible mixture of the gas with the requisite proportion of air. A town gas of 460 B.Th.U. per c.ft. may require 6 volumes of air for its proper combustion—thus giving per 100 cubic inches of combustible mixture entering the engine a total of 3·8 B.Th.U. A typical suction gas will contain only 140 B.Th.U. per c.ft.; but it will require only 1¼ volumes of air to 1 of gas for its complete combustion. Each 100 cubic inches of such a combustible mixture, notwithstanding the apparent weakness of the gas, will contain a total of 3·6 B.Th.U. The apparently weak gas is thus seen to be a satisfactory medium, subject to other considerations—such as velocity of flame propagation and mean effective pressure in the cylinder. Gases of low calorific value may for power purposes (due to their lesser requirements of air) be nearly as good as town gas. Using ordinary petrol, the number of B.Th.U. per 100 cubic inches of combustible mixture entering the cylinder is usually found to be between 4·25 and 4·5.

The Future.

There will be occasion in years to come for the utmost production of every class of motor fuel. There is a definite limit to the world's output of petrol, but not to users' requirements. Gas, benzol, alcohol, petrol, and all possible fuels will be wanted to meet transport and other calls for power from internal-combustion engines. Gas traction is not merely a temporary war-time expedient; the portents are in favour of its continued and extended use, on a competitive basis in the first place, and by degrees on the ground of equal convenience, no matter what liquid fuels may be offered.

I cannot conclude this address without taking the opportunity to acknowledge most cordially the valuable assistance which the Gas Traction Committee have at all times received from the gas industry as a whole. Our Chairman to-day, Mr. Alderman Kay, has been among the foremost who have recognized the commercial and economic advantages of modern applications of gas traction, for which good prospects improvements in the construction of internal-combustion engines during the last twenty years are largely responsible. The British Commercial Gas Association, chiefly through the Chairman of the Executive Committee, Mr. F. W. Goodenough (who, with Alderman Kay, represents the gas industry on the Gas Traction Committee), the National Gas Council, the Institution of Gas Engineers, and the principal officers and managers of many leading companies and municipal undertakings, have shown an interest which it is confidently believed will both be maintained and rewarded.

Irish Gas Prices.—The Armagh Gas Company have increased the price of gas, as from Jan. 1, from 5s. 10d. to 6s. 8d. per 1000 c.ft. In recommending an increase in the price of gas from 4s. 6d. to 5s. 10d. per 1000 c.ft. for lighting purposes, and 5s. for power, the Finance Committee of the Armagh Urban Council stated that the cost of manufacture, distribution, and management was 4s. 2d. per 1000 c.ft., and that the interest on loans would add a further 1s. 7d., making a total of 5s. 9d. As the price of coal had increased by 10s. per ton, they were merely seeking to distribute the cost of running the undertaking as fairly as possible between the respective classes of ratepayers. The Council approved the recommendation.

RATES AND CHARGES IN A NUMBER OF TOWNS.

Comparative Statistics from Preston.

The close of another year again brought with it, from Mr. W. Allison Davies, the Borough Treasurer of Preston (Lancs.) a copy, to date, of his annual comparative statement with regard to the charges made for gas, electricity, and water for household purposes, and profits and losses on municipal undertakings, together with the rates levied, in a number of Provincial towns and some Metropolitan boroughs. The present issue is the thirty-fourth of the series; and it covers the financial year 1918-19. On this occasion, a column has been added giving, for comparative purposes, the rates levied in the year 1913-14, which was the last completed year prior to the war.

The number of towns with regard to which information is given in the present return is 142 (which is four more than a year ago); but in several instances merely the total rates levied, without any details, are given. Special war conditions are, of course, again responsible for results revealed throughout the tables. With reference to the rateable value of the places that are mentioned, the highest figures shown are: Westminster, £7,000,813; Liverpool, £5,118,860; Birmingham, £5,026,517; Manchester, £4,853,370; Kensington, £2,449,540; Leeds, £2,269,067; Sheffield, £2,124,385. The smallest are: Clitheroe, £53,143; Mossley, £66,193; Kendal, £70,855; Newark, £77,401; King's Lynn, £80,268; Bacup, £89,191; Brighouse, £89,751; Haslingden, £90,615; Ilkeston, £91,754. The populations range from 840,000 in the case of Birmingham to 12,500 in that of Clitheroe.

Rates have been generally "going up;" and there is this year a large increase in the number of towns which are rated at 9s. or over in the pound. The names and amounts are as follows: West Ham, 14s.; East Ham and Merthyr Tydfil, 13s. 8d.; Stoke-on-Trent, 11s. 11d.; West Bromwich, 11s. 8d.; Wolverhampton, 11s. 7d.; Walsall, 11s. 5d.; Halifax, Rotherham, and Stalybridge, 11s. 4d.; Norwich, 11s. 3d.; Ashton-under-Lyne, 11s. 2½d.; Bacup, Birmingham, Hull, Nelson, and St. Helens, 11s.; Colchester, 10s. 11d.; Chorley and Rochdale, 10s. 9d.; Liverpool (average) and Wigan, 10s. 8½d.; Batley, Bradford, Brighouse, and Oldham, 10s. 8d.; Preston and Stockport, 10s. 7d.; Colne, Heywood, Ilkeston, Leeds, Leigh (Lancs.), Lowestoft, and Swindon, 10s. 6d.; Salford, 10s. 5½d.; Mossley, 10s. 5d.; Wakefield, 10s. 4d.; Blackburn, Chesterfield, Darwen, Ipswich, Sheffield, and Smethwick, 10s.; Barnsley and Rawtenstall, 9s. 11d.; Nottingham, 9s. 10d.; Middleton, 9s. 9d.; Bristol, Keighley, Macclesfield, Middlesbrough, and Swansea, 9s. 8d.; Leicester, Manchester, and Northampton, 9s. 7d.; Mansfield, 9s. 6d.; Hyde and Southampton (average), 9s. 5½d.; Chatham, 9s. 5d.; Bolton (average), Canterbury, Grimsby, Harrogate, and Warrington, 9s. 4d.; Stockton-on-Tees, 9s. 3d.; Burton-on-Trent and Haslingden, 9s. 2d.; Accrington, 9s. 1d.; Birkenhead, Stafford (average), and Widnes, 9s. Those rated at 6s. or less in the pound are: Oxford, 4s. 11d.; Blackpool and Kendal, 5s. 6d.; Bournemouth, 5s. 9d.; Eastbourne, 5s. 10d.

By transfers from municipal undertakings, &c., the rates levied in the following towns have been reduced to the extent of 1s. or more in the pound: Wallasey, 1s. 7d.; Liverpool, 1s. 3½d.; Bolton, 1s. 2d. The total number of towns in the statistics in which the rates have been decreased by transfers from municipal undertakings (many of the amounts being very small) is 97; and, in addition, profits were in a few instances carried to reserve.

On the other hand, deficiencies on municipal undertakings have necessitated increases in the rates in 78 cases, compared with 74 a year ago. There were at the same time in some instances other undertakings which were able to reduce the rates. Amounts over £50,000 are: Birmingham, £139,186; Bristol, £76,000; West Ham, £73,875; Preston, £68,984. The loss in Birmingham was almost wholly due to water; while for that at West Ham the electric light undertaking was mainly responsible. There is not a single instance of loss being shown under the heading of gas. The most numerous entries relate to water; but electric light figures a good many times. There are, as a matter of fact, fourteen cases of loss in regard to electricity undertakings; the largest being: West Ham, £46,500; East Ham, £7785; Kingston-on-Thames, £5790. The amounts in the pound by which the rates were increased by deficiencies on municipal undertakings totalled 1s. or more in the following cases: Preston, 3s. 2¾d.; Bacup, 2s. 7¾d.; Harrogate, 2s. 0¾d.; Heywood, 1s. 9d.; Stockport, 1s. 3½d.; Middleton, 1s. 3d.; West Ham, 1s. 2½d.; Stockton, 1s. 0½d.

As to the charges made for gas and electricity in the various towns that are included in the list, there are on this occasion upwards of thirty places named in which the net charge per 1000 c.ft. for a domestic supply of gas for lighting purposes is 4s. or more, as compared with three a year ago. The charge at Lowestoft is 5s. 6d. per 1000 c.ft.; Ilkeston 5s.; Haslingden and Southend, 4s. 7d.; Darwen, 4s. 4¾d.; Chelsea, East Ham, Hampstead, Islington, Kensington, Leigh, and Westminster, 4s. 4d.; Barrow-in-Furness (average), Canterbury, Rawtenstall, Richmond (Surrey), and Wimbledon, 4s. 3d.; Nuneaton, 4s. 2½d.; Bacup, Batley (average), Brighton, Chatham, Hove, and Portsmouth, 4s. 2d.; Bromley 4s. 1d.; Barnsley, Ealing, Eastbourne, Eccles, Heywood, King's Lynn, Mossley (average), Newport (Mon.), Swindon, Worthing, 4s. It appears from the table that in the following towns gas for domestic lighting supplies is sold at 2s. 6d. or less per 1000 c.ft.: Middlesbrough, 2s.; Bath and Widnes, 2s. 3d.; Coventry, 2s. 4d.; Gloucester, 2s. 4½d.; Crewe, Lancaster, and Northampton, 2s. 5d.; Sunderland, 2s. 6d.

In the column dealing with electricity, the charge per Board of Trade unit for a domestic lighting supply ranges from 8d. downwards; the places where the figure is over 6d. per unit being: Bromley (flat rate), Chatham, Ealing, Gloucester, Hornsey (flat rate), Kendal, Kensington, Kingston-on-Thames, Macclesfield (flat rate), 8d.; Darwen, 7¾d.; Bournemouth, Hove, Walsall, and Worthing, 7½d.; Brighton (flat rate), Carlisle, Cheltenham, Croydon (flat rate), Leamington, Lincoln, Preston, and Scarborough, 7d.; Hampstead (flat rate), Lowestoft, and Oxford, 6¾d.; Bath, Lancaster, Middleton (flat rate), Newport, Mon. (flat rate), and Westminster, 6½d.; Burton-on-Trent, Derby, Nuneaton (flat rate), Peterborough (flat rate), Rochdale (flat rate), and Stoke-on-

Trent (average), 6½d. The charge is 3½d. per unit at Coventry (flat rate); 3¾d. at Middlesbrough (flat rate); and 4d. at Bolton (flat rate), Burnley (flat rate), Chester, Darlington (flat rate), Gateshead (average), Oldham, Salford (flat rate), South Shields (flat rate), Wolverhampton (flat rate), and Widnes.

LOCAL FUEL AND LIGHTING JOINT COMMITTEES.

Audit of Accounts.

The Local Fuel and Lighting Joint Committees (Audit of Accounts) Order, 1918, dated Dec. 23, has been made by the Board of Trade under Regulations 2J (1) and 2JJ of the Defence of the Realm Regulations, as follows:

Whereas by virtue of the Household Fuel and Lighting Order, 1918, two or more local authorities in England and Wales have power to unite for the purpose of carrying out the duties imposed upon them by the said Order, and in such case to appoint a local Fuel and Lighting Committee for the united district; and whereas, by virtue of the Household Fuel and Lighting (Scotland) Order, 1918, two or more local authorities in Scotland have power to combine for the purpose of carrying out the duties imposed upon them by the said Order, and to appoint a Joint Local Fuel and Lighting Committee; and whereas it is expedient to make provision for the audit of the accounts of such Committees (hereinafter referred to as Local Fuel and Lighting Joint Committees); now, therefore, in exercise of the powers conferred upon them by Regulations 2J (1) and 2JJ of the Defence of the Realm Regulations, the Board of Trade, in pursuance of an arrangement made by them with the Local Government Board and the Secretary for Scotland, hereby order:

1.—The accounts of the receipts and expenditure of Local Fuel and Lighting Joint Committees appointed by two or more local authorities in England and Wales in pursuance of the Household Fuel and Lighting Order, 1918, shall be made up yearly to March 31; the first account being made up to March 31, 1919, and shall be audited by a district auditor; and the enactments relating to audit by district auditors of accounts of urban district councils and their officers, and to all matters incidental thereto and consequential thereon, shall apply to the audit of the said acocunts.

2.—The accounts of the receipts and expenditure of Local Fuel and Lighting Joint Committees appointed by two or more local authorities in Scotland in pursuance of the Household Fuel and Lighting (Scotland) Order, 1918, shall be made up yearly to March 31; the first account being made up to March 31, 1919; and the accounts shall be audited by an auditor appointed by the Secretary for Scotland, who may in case of dispute fix the fee to be paid for the audit.

3.—This Order may be cited as the Local Fuel and Lighting Joint Committees (Audit of Accounts) Order, 1918.

THE BUENOS AYRES GAS SCANDAL.

Following upon his report [reproduced on p. 717 of last week's issue of the "JOURNAL"] that the Municipality of Buenos Ayres had issued a decree which practically cancelled the Primitiva Gas Company's concession, the local correspondent of "The Times" cabled last Wednesday that the Company had cut off the gas supply in all municipal offices and municipally-controlled highways. An exception was made in favour of municipal hospitals. He added that it is the intention of the Municipality to substitute oil and electricity.

Commenting upon the matter in their City Notes yesterday, "The Times" said: The latest phase of the Buenos Ayres gas dispute is the inevitable result of the unfriendly attitude which the Municipality have adopted towards the Primitiva Gas Company since the war began. Difficulties first arose over the non-payment of the Municipality's gas bill. Subsequently the Company asked for permission to raise their rates in order to enable them to meet the greatly increased charges for fuel, which have caused very heavy losses to the Company. It was arranged that this and other matters should be referred to arbitration. The Arbitration Court decided in favour of the Company. More than twelve months, however, have elapsed since the award was given; but the Municipality have not yet complied with it. The Company has borne a long succession of "pin-pricks" with extraordinary patience; but in cutting off the supply of public lighting, they have apparently decided to take their courage in both hands and to await the result. There is very good reason for believing that the difficulties which have been placed in the way of the Company have had their origin in German influence. Many circumstances go to confirm this belief, including the grant of a virtual monopoly of oil fuel to the German Electricity Company, thereby preventing the English Company from obtaining this class of fuel. The attitude which has been adopted towards the railways since the war, and this protracted gas scandal, to mention only two of the unpleasant features of the treatment meted out to British capital in Argentina, has made a very unfavourable impression upon investors here, in France, and in the United States. It is impossible to calculate what damage Argentine credit has sustained thereby; but it is certainly serious. It seems extraordinary that Argentina, the development and prosperity of which are primarily due to the hundreds of millions of capital that have been poured into the country chiefly by British investors, should not have appreciated the importance of adopting a sympathetic attitude and retaining their goodwill.

Under the title of "Must we Trade in Tenths?" Mr. Alfred Watkins, Fellow and Progress Medallist of the Royal Photographic Society, has issued in pamphlet form a plea against decimal, and for octaval, coinage, as more exactly fitting the wants and usage of all who make, grow, buy, or sell things. The booklet is published, price 3d., by the Watkins Meter Company, of Hereford.

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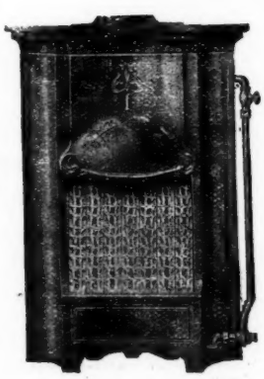

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 6.

Pitch continues in a strong position, with good inquiry for export, and the value at something over 65s. net per ton f.o.b. makers' works. It is expected that creosote will shortly be released from official control. The strength of the market will then be realized; America being a serious buyer. Crude carbolic acid 60's is rather weak in consequence of the drop in the value of crystal carbolic. It is understood that the current price has not yet been arranged between makers. Solvent naphtha is not brisk, and the price is about 3s. 3d. to 3s. 6d. net per gallon, packages extra. Other tar products are without change.

The position of sulphate of ammonia is also unaltered.

Tar Products in the Provinces.

Jan. 6.

The average values for gas-works products during the week were: Gas-works coal tar, 31s. to 36s. Pitch, East Coast, 44s. to 45s. per ton; West Coast—Manchester 37s. 6d. to 40s., Liverpool 37s. 6d. to 40s., Clyde 37s. 6d. to 40s. nominal. Benzol 90 p.ct., North, 1s. 10d. to 1s. 11d.; 50-90 p.ct., naked, North, 1s. 7d. to 1s. 8d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent Naphtha, naked, North, 2s. 10d. to 2s. 11d. Heavy naphtha, North, 2s. 11d. to 3s. Creosote, in bulk, North, 4¼d. to 4½d. Heavy oils, in bulk, North, 5d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 6d. naked, nominal. Naphthalene, £25 to £30; salts, £6 to £7, bags included. Anthracene, "A" quality, 4d. to 6d. per minimum 40 p.ct.; "B," 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

The advent of the New Year has produced very little accession of business in the tar products markets. There is, therefore, practically nothing fresh of consequence to report. It is, however, being gradually realized, except perhaps by Government Departments, which in some directions still pursue the questionable policy of restriction, regulation, and general interference, that there is a new outlet for every product which the Government required for the conduct of the war; and the only things standing in the way of profitable utilization are the few irksome restrictions which still remain. The position of benzol, to which I referred last week, is still interesting, in view of the continued efforts of petroleum interests—and those closely allied to the Government—to obtain some measure of control over the trade. Such a position seems to be undesirable and without justification, and ought to be resisted; for it would simply mean that eventually all price adjustments would be out of the power of producers. Makers are asking still higher prices for toluol; but it is very doubtful whether the dye interests can afford to pay much more. Naphthalene and naphthas are without much change, and buyers of the latter are still content merely to cover immediate requirements. Fuel oils are a trifle uncertain; but there is a good inquiry for creosote, which should increase as the year advances. Carbolic acid is much about the same, although crystals are dull and tend towards lower prices. Pitch is maintained at 65s. London, with Provincial rates still inclined to harden. Other products are without change. The range of quotations is as follows:

Benzol: 90% London, 2s. per gallon; 50-90%, 2s. per gallon.

Carbolic Acid: 60% East and West Coast 3s. per gallon; crystals 40% 1s. 4d. per lb.

Crude Tar: London 39s. to 41s.; Midlands 33s. to 35s.; North 32s. to 34s. per ton *ex* works.

Pitch: London 65s. per ton f.o.b. works; East Coast, 38s. to 42s.; West Coast, 41s. 6d. to 43s. f.a.s.; Manchester, 41s. to 42s.; Clyde, 41s.; South Wales, 45s. to 46s. per ton.

Solvent Naphtha: London 3s. 9d. to 4s.; North and Midlands 3s. 3d. to 3s. 6d. per gallon.

Crude Naphtha: Naked 1s. 1d. per gallon.

Heavy Naphtha: London 3s. to 3s. 6d.; Provincial 3s. 3d.

Naphthalene: Refined £28 per ton nominal; salts 80s., bags included.

Toluol: Naked, 3s. 4½d. per gallon nominal.

Creosote: Nominal, London 4½d.; North 4d. to 4¼d. (Government price, 75s. per ton f.o.b.—equal to 4⅞d. per gallon); heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1⅜d. to 2½d.

Cresylic Acid: 95%, 3s. per gallon; 97-99%, 3s. 3d. to 3s. 6d. per gallon, casks included, *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

No alteration in conditions is to be expected for some time to come, as in view of the official engagements to the agricultural community control of the product is hardly likely to be removed until it is certain that the home trade will be fully protected as well as export demands attended to. At present, there is little doubt that, owing to the high prices that foreign buyers, especially neutrals, are willing to pay, the largest part of the make would be exported were the control to be at once removed. Just how long restrictions will continue, it is impossible to say at the moment. Trade in many other lines of business is rapidly becoming normal; and restrictions are being removed with more speed than one dared to hope for even a couple of weeks ago. It is quite likely that the position in sulphate may become much clearer by the end of the month.

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

Messrs. Royse's Market Report for 1918.

In the course of their review of the chemical trade of the Manchester District during last year Messrs. S. W. Royse & Co., Ltd., say: The release of various tar products was announced just before the holidays; and it is too soon yet to judge of the effects. All available supplies of benzol, 50-90 p.ct. and 90 p.ct., have readily been absorbed into consumption at the control price of 1s. 5d. and 11½d. per gallon respectively. These figures have been unchanged since the Government restrictions were effected until the last few days, when the restrictions were withdrawn, and prices have consequently hardened owing to the large demand which is expected for this product for motor purposes. Large sales of crude benzol have already been made over 1919 at increased figures, as a natural sequence to the rise in values of the refined product. Solvent naphtha came under control in January, when the price was 3s. 9d. to 4s. per gallon; and, as the restrictions had the effect of diverting supplies solely to Government work, prices gradually declined, and the market is steady at about 3s. per gallon. Creosote has remained practically unchanged all the year at about 3¾d. per gallon; and supplies have readily been absorbed in official requirements for fuel purposes. Crude carbolic acid was without change at 3s. 6d. until July, when the control was withdrawn and prices became easier. Since then, by arrangement, the price was fixed for the remainder of the year at 3s. 8½d. per gallon. Liquid and crystal carbolic acid were in good request during the year. Pitch advanced from 18s. 6d. to 42s. 6d. per ton; and with the promising outlook of more freight available, and the expected large demand from the Continent, the tendency is for still higher prices. Some large sales have been made over next year for the home trade at increased values. In sulphate of ammonia, the home demand both for agricultural and munition purposes has been more than sufficient to account for all supplies, which have gone into consumption at controlled figures. Consequently there has been very little free for export.

Conisborough Gas Supply.—The Doncaster Rural District Council have given notice of objection to an appliation to be made by the Conisborough Gas Company for power to increase the maximum price of gas from 5s. to 6s. per 1000 c.ft. Complaints were made of the poor quality of the gas and bad street lighting at Conisborough; and it was resolved that the Company be urged to improve the street lighting and the quality of the gas as early as possible.

Increased Prices at Morley.—The Morley Town Council were informed on Friday that the Local Government Board had sanctioned a maximum charge of 5s. 6d. per 1000 c.ft. for gas. The Gas Committee recommended that prices should be increased as follows: For lighting, from 4s. to 4s. 9d. per 1000 c.ft.; for heating, from 3s. 7d. to 4s. 4d.; prepayment meters, from 4s. 7d. to 5s. 4d. An amendment that the discount to ordinary meter users be reduced by one-half, in fairness to the highly-charged prepayment meter consumers, was defeated; and the recommendation was adopted.

Halifax Gas Engineer Thanked.—The Halifax Gas Committee have voiced their thanks to Mr. W. B. M'Lusky (the Engineer and Manager) for his untiring efforts to make the bye-product plants at the Corporation gas-works a success. The plants have yielded a substantial profit, after paying all the initial cost out of revenue.

Price of Gas at Doncaster.—The Doncaster Town Council having received sanction to their proposal to increase the maximum price of gas to 4s. per 1000 c.ft., the recent decision to advance the rate to 3s. 9d. as from Dec. 24 now becomes operative. It is the seventh increase during the past few years. The price immediately before the war was 2s. 2d. per 1000 c.ft.

Gas Supply Cut Off by Cliff Subsidence.—A landslide embracing a portion of the cliff road connecting Ilfracombe with Combe Martin resulted in the temporary cutting off, owing to damage to the main, of the gas supply to the village named. Fortunately the landslide occurred at night, and no damage to traffic resulted. A deviation of the road, which circles the cliff 250 ft. above sea-level, had been authorized, and will be taken in hand as soon as labour is available.

Gas Workers and Income-Tax.—Signs of the well-remunerated working man's desire to avoid payment of income-tax are seen in a report by the Dewsbury Gas Committee to the Town Council, stating that the gas stokers had refused to work extra shifts as occasion required, if payments for such work were included in the quarterly return of wages. The Committee say they have informed the stokers that all earnings must be included in the return.

Bath-Heater Regulations in Australia.—The Sydney (N.S.W.) Municipal Council have approved of the following draft bye-law submitted by the Acting City Health Officer, to regulate the use of bath-heaters in the city: No owner or occupier of premises within the city of Sydney, and no person, shall fix, cause to be fixed, suffer or permit to be fixed, or to remain fixed, any coal-gas-heating apparatus or contrivance in any bathroom or other place within any building in the city of Sydney, unless such apparatus be provided with a gas-tight exhaust tube communicating direct to the outer air, and such bathroom or other place be provided with ample means of ventilation direct to the outer air, to the satisfaction of the Health Officer.

Bournemouth Gas Company's Proposals.—The decision of the Poole Town Council to oppose the Bill which the Bournemouth Gas and Water Company contemplate promoting in Parliament, has been followed by a collective protest from residents, who, at a meeting, passed a resolution that they "view with considerable alarm the projcts of the Bournemouth Gas and Water Company, whereby they are desiring powers by Act of Parliament to construct new works in the district of St. James' East, Poole, by acquiring certain house property and land, the erection of structures thereon, the construction of an aerial railway crossing public roadways, and other works." Having regard to the detrimental effect on all property within the vicinity of such works, the injurious effect on health, the danger to life and the injury to local industry, they ask that the powers be not granted.

Gas and the Housing Scheme.

250 "Bungalow" Cookers have recently been ordered for an estate being erected by His Majesty's Office of Works.

Gas Equipment for the Housing Scheme is the opportunity of the moment.

The exceptional suitability of the "Bungalow" Cooker (made in four sizes) is emphasized by the following extract from an Article on "Housing," in the B.C.G.A. "Bulletin":—

> "The Oven should be raised at least six inches from the ground on legs or a stand to lessen the necessity of stooping, and to enable and induce the housewife more readily to keep the floor surface clean. A plate rack with an enamel back plate should be provided, the former for utility and the latter for hygiene."

These and other essential requirements are all complied with in this efficient series of cookers.

THE RICHMOND

GAS STOVE & METER CO., LTD.,

WARRINGTON - and - LONDON.

British Coke-Ovens, Ltd.

The Official Receiver in the Companies Winding-Up Division of the High Court of Justice has issued his report under the liquidation of British Coke-Ovens, Ltd., of No. 7, Princes Street, Westminster, from which it appears that the total ranking liabilities amount to £6647. The assets are estimated to produce £345—thus leaving a deficiency of £6302. The paid-up capital of the Company is £10,687, to which has to be added the deficiency of £6302, making the total deficiency £16,989. The Company was incorporated on Dec. 29, 1913, as a private one, for the purpose of carrying on business as designers and constructors of coke-ovens and plant for treating the bye-products and residuals arising from the carbonization of coal. The Company acquired from Mr. F. M. N. Schuster several patents and inventions. In March, 1915, the Company entered into a contract with the proprietors of a large colliery in South Wales for the erection of a battery of forty waste-heat coke-ovens, for £6050. Upon the completion of the ovens, they were tested, but failed to work properly. In July, 1916, the Company made a contract with another colliery proprietor for the erection of a battery of twenty-five patent regenerative coke-ovens for £9000. In this case, the ovens worked satisfactorily; but owing to the fusion of the fire-brick linings, a claim for £1000 damages was made against the Company, against which £500 was recovered from the makers of the fire-bricks. In consequence of the failure of the first battery of coke-ovens, the colliery proprietors claimed from the Company damages amounting to £44,597. The Company disputed the claim, alleging that the colliery proprietors failed to provide coal in suitable condition for coking, or efficient labour for starting and working the ovens, and also that certain auxiliary machinery provided by them was inefficient. The dispute was referred to arbitration; and the Umpire found the Company had failed to carry out the contract, and assessed the damages to be paid to the colliery proprietors at £5366, together with two-thirds of the colliery company's costs of attending the arbitration proceedings. The colliery company subsequently presented a petition, on which a compulsory winding-up order was made. According to the annual balance-sheets and accounts, the Company's business has been carried on at a loss from the commencement; but the failure is attributed by the Directors to the adverse award referred to.

Penistone Gas Company's Maximum Price.—The Thurlstone Urban District Council have decided to oppose the application of the Penistone and District Gas Company to the Board of Trade, under the Temporary Increase of Charges Act, for authority to raise the maximum price of gas from 4s. 6d. to 5s. per 1000 c.ft.

Coal Shortage at Oldbury.—When complaint was made at a meeting of the Oldbury Urban District Council about the delay in restoring the 50 p.ct. of public lighting now permitted, it was stated that this was due to the shortage of coal. It was observed that they had only a week's supply of coal in hand at the gas-works.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Dec. 30.]

Nos. 20,907—21,471.

ANDERSON, E. E. W.—"Gas-meter." No. 21,156.
ANDERSON, J.—"Coin-operated prepayment meter-mechanism." No. 21,464.
BALLINGALL, J. M.—"Process relating to reducing operations in hydrogen-making plants." No. 20,941.
BEDFORD, R. A.—"Gaseous fuel-burners." No. 21,277.
BIGGART, J. L.—"Machine for separating gases." No. 20,928.
COLMAN, H. G.—"Extraction and recovery of carbon-bisulphide." No. 21,389.
CRUSH, E. H.—"Gas-producing plant." No. 21,021.
DAVIES, W. E.—"Carbonization of fuel by vertical coke-ovens, &c." No. 21,239.
DEMPSTER, R. & J.—See Ballingall. No. 20,941.
DONALD, W.—"Manufacture of refractory materials such as bricks, blocks, &c., used in construction of furnaces, &c." No. 21,038.
FULLER, H.—See Bedford. No. 21,277.
GRANBERG, A. J.—"Liquid meters." No. 21,262.
IONIDES, A. C.—"Gaseous combustion." No. 21,314.
KIRKWOOD, J.—"Incandescent gas-burners." No. 20,909.
LATHAM, J.—"Anti-vibrator for incandescent gas-burners." No. 21,241.
LINDBERGH, A. V.—"Process of recovering salts from mother liquors." No. 21,462.
MAIN, A.—"Construction of internal-combustion engines." No. 21,433.
MEKER, G.—"Temperature regulators." No. 20,998.
NICHOLLS, J.—"Spark gas-lighter." No. 20,922.
PRICE, W. E.—"Appliance for regulating or checking draught in flues." No. 21,048.
SANKEY, C. H.—"Manufacture of fire-bricks, blocks, tiles, retorts, &c." No. 21,315.
SMEETON-WRIGHT FURNACES, LTD.—"Gas-fired furnaces." No. 21,184.
WADE, H.—See Lindbergh. No. 21,462.
WILLIAMS, I.—"Mechanical coal feeds on gas-producers." No. 21,362.
WRIGHT, T.—See Smeeton-Wright. No. 21,184.
YEOMAN, E. W.—See Colman.—No. 21,389.

The Elland District Council have appointed a Sub-Committee of seven to inquire into the matter of the proposed purchase of the undertaking of the Elland-cum-Greetland Gas Company, which supplies Elland and the urban districts of Greetland, Stainland, and Southowram.

DAVIS Stoves for the New Hiring List

¶ The inevitable revision of their Hiring arrangements to meet the new conditions will be used by many Gas Undertakings as an opportunity for discarding the older stoves in favour of the most modern and efficient types.

¶ The soundness of such a policy will be placed beyond doubt by the adoption of DAVIS Stoves, which facilitate maintenance by their simple and standardized construction, and delight consumers by their convenience and economy.

Deliveries of Cookers and Fires from Stock.

THE DAVIS GAS STOVE CO., LTD.,
60, Oxford Street, London, W. 1.

Hornsey Gas Company's Increase in Price.—The Directors of the Hornsey Gas Company, in consequence of the further increase in the cost of coal, have raised the price of gas 3d. from 3s. 1d. to 3s. 4d. per 1000 c.ft., as from the September (1918) quarter's meter reading. The price of gas supplied through prepayment meters will also be increased accordingly.

Munition Plants at St. Louis.—On the signing of the armistice, all work was suspended on the two munitions plants that were being erected by the Laclede Gas Light Company, of St. Louis, at an estimated cost of $8,000,000. One of the plants was one-third completed; and the other had progressed a little further. Some 7000 men were to have been employed in the finished works.

Price of Gas at Chelmsford.—The Chelmsford Corporation Gas Committee have considered the question of increasing the price of gas, and have had before them statements showing the estimated income and expenditure for this year, which showed that the charge will have to be considerably increased if the undertaking is to be carried on without loss. They therefore recommend that the price of gas supplied by ordinary and prepayment meter in the borough of Chelmsford, and the parishes of Springfield, Broomfield, Great Baddow, Widford, and Writtle be increased 6d. per 1000 c.ft.

Wages Demands in Australasia.—With the object of securing a variation of the award in the Federal Arbitration Court, the Gas Employees' Union have served demands for increased wages on the gas companies in Victoria, South Australia, New South Wales, and Tasmania. An increase in the minimum wage from 10s. 6d. to 12s. a day is asked for, and also increases in pay for higher grades of work.

War-Wage Advances and Sick Pay.—A letter was read at a meeting of the Burnley Corporation Gas Committee, from Mr. L. Burrows, the Local Secretary of the National Union of General Workers, in which he asked the reason which induced the Committee to cease paying the lighting superintendent, temporary storekeeper, weighman, foreman meter inspector, prepayment meter collectors, and meter inspectors their wages during absence from work through sickness. The Committee agreed that the writer should be informed that these men had applied for the war wage advance of 20s. and 12½ p.ct. bonus which was granted to the workmen employed in the department; and that the arrangement as to men being paid during absence from work through sickness was only applicable to the clerical staff, with whom the employees named had formerly been classed. If such employees desired to be treated in the same way as the clerical staff, they would have to accept the same war wage advance as the clerical staff.

STOCK MARKET REPORT.

THE Stock Exchange reopened last week after its long holiday; but only for an abbreviated period, as the closing again on New Year's Day bisected it into two short snatches, which naturally handicapped business. Thus markets in general were very quiet, and, in fact, hardly got fairly started until almost the end of the week. However, buyers were not lacking, and on the whole the tone, which had all along been firm despite the inactivity, was at its best at the close.

The gilt-edged division was in good case. Home Government issues were in demand. The 5 p.ct. War Loan was very firm, and finished at a moderate advance. The 3½ p.ct. Loan also did well. Consols at one period looked rather uncertain; but they closed unchanged. Indians were well supported. Home Rails were in good request; sanguine forecasts of arrangements with the Government after peace is secured being entertained. Canadians showed some improvement; but Argentines were dull.

The Foreign Market in general was steady, with the exception of Russian securities; the unhappy plight of that country in the hands of the Bolsheviki being most depressing. French, Belgian, Scandinavian, and Chinese were firm. Among Miscellaneous concerns, Iron and Steel undertakings, which are reported to be full of orders for peace trade ahead, and Breweries were the most noticeable for strength.

Business in the Gas Market was not abundant; but there was enough of it to indicate that the general tendency was decidedly favourable. This was emphatically shown in the debenture issues, some half-score of which were advanced by about the value of the six months' interest paid at the close of the year. Not a bargain was done in Primitiva shares, ordinary or preference. The latest intelligence regarding the position in Buenos Ayres is to the effect that the Company have replied to the Municipality's attack by cutting off the gas from municipal highways and offices, other than the local hospitals.

Bargains done for cash during the week were as follows: On Monday, Bombay 6, Gas Light ordinary 73, 73¼, 73⅜, ditto preference 70, ditto debenture 56, Imperial Continental 120, 121, South Metropolitan 75⅜, 76, Hastings and St. Leonard's 5 p.ct. 65. On Tuesday, Brighton and Hove original 140, Gas Light ordinary 73, 73⅜, ditto preference 69¾, 69⅞, 70, 70¼, ditto debenture 56, 57, Imperial Continental 120, 120⅛, 121⅛, Primitiva debenture (1911) 55, South Metropolitan 75⅛, South Suburban 76⅛. On Wednesday, the Exchange was closed. On Thursday, Commercial 3½ p.ct. 60¼, 62½, Continental Union 50, 50½, European 13¼, Gas Light ordinary 73, 73¼, 73⅛, 73⅜, 74, ditto maximum 56, ditto preference 69¼, 69⅝, ditto debenture 56, Imperial Continental 120, 121, 121⅛, Primitiva debenture 75⅜, 75⅛, South Metropolitan 75⅛, 75⅜, 76¼, 76⅜, 76⅜, South Suburban 77. On Friday, Continental Union 50, ditto preference 74, Gas Light ordinary 73⅛, 73⅜, 73⅝, 74, ditto preference 69⅝, 70, Hastings and St. Leonard's 3½ p.ct. 46½, Imperial Continental 120, Portsea "C" 61½, South Metropolitan 75⅛, 75⅜, 76½, South Suburban 80, Barnet 102, 102½.

In the Money Market, there was a smart demand on the last day of the old year, after which the position was extremely easy. The Bank rate remains at 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When Div.	Ante-War Dividend & Bonus p.c.	Last Div.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,551,868	,,	April 8	2½	4⅜	Alliance & Dublin Ord.	59—64	51—56	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	62—67	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6⅛	5½—6	6
50,000	10	Feb. 26	16	11%		29—30	22—24	..
888,110	10	,,	7	7%	Bournemouth Gas and Water { 10 p.c. B ¶ p.c. Pref. 5 p.c. 4 p.c. Deb.	15—15½	10½—11½	..
115,000	10	,,	6	6/.		13½—14	9½—92	..
159,740	—	—	—	4%		..	66—68*	..
992,045	Stk.	Feb. 26	14	4⅜	Brentford A Consolid.	261—266	78—81	..
784,290	,,	,,	11	4⅜	Do. B New	204—209	70—73	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	77—82	..
231,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	62—64	..
217,380	,,	Feb. 26	11	8⅛%	Brighton & Hove Orig.	208—213	140—145	140
344,360	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	97—102	..
983,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
580,000	20	Mar. 26	12½	22/6	British	44—45	31½—32½	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66*	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—53*	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	3⅜—4⅜	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7⅜—9⅜	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	50—55*	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,513,280	,,	Feb. 19	5/9/4	36/-	Commercial 4 p.c. Stk.	106—108	62—67	..
580,000	,,	,,	5½	30/-	Do. 3½ p.c. do.	108—106	60—63	60½—62½
476,000	,,	June 11	8	8%	Do. 8 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	50—55	50—50½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	70—75	74
51,600	Stk.	—	14½	13½%	Croydon A 10 p.c.	..	160—170	..
278,400	—	—	—	10½%	Croydon B and C 7 p.c.	..	135—140	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	128—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—88	..
1,009,180	10	July 29	10	5/0	European, Ltd.	17½—18	13—14	13½
16,298,975	Stk.	Feb. 10	4/17/4	29/4	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds	98—102	72—74	73—74
2,600,000	,,	,,	3½	3½%		76—79	55—57	56
4,062,235	,,	,,	4	4%		96—99	69—71	69½—70½
4,674,850	,,	June 11	3	3%		72½—74½	55—57	56—57
150,000	,,	,,	10	10%		..	..	..
—	—	—	—	..	Hastings & St. L. 5 p.c.	..	60—65	..
268,740	,,	Mar. 12	5	2½%	Do. 3½ p.c	87—89	45—50	46½
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7⅜—8⅛	..
86,600	—	—	—	9%	Hornsey ¶ p.c.	..	117—122	..
181,000	Stk.	Mar. 12	7½	6⅞%	Ilford A and C.	151—154	92—97	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	62—65*	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	120—125	120—121½
1,335,000	,,	Feb. 12	8½	3⅝%	Do. 3½ p.c. Deb. Red.	84—86	71—73	..
286,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	93—98	..
2,498,906	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A B	144—148	82—84	..
806,088	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
—	—	—	—	—	Maidstone 5 p.c.	..	60—65	..
75,000	5	June 11	6	8%	Malta & Mediterranean	4½—4⅝	3½—3⅞	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	90—97	..
541,920	20	May 26	4	6/-	Monte Video, Ltd.	11½—12	9½—9⅞	..
1,875,822	Stk.	July 29	4½	3⅛%	Newcastle&Gatsh'dCon.	96½—99½	71—73	..
539,795	,,	June 26	3½	3⅜%	Do. 3½ p.c. Deb.	83—88	57—59*	..
55,940	10	Feb. 26	1/14/0	1/-	North Middlesex ¶ p.c.	14—15	9½—10½	..
800,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—105	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	4—5	..
60,000	50	Feb. 26	12	9%	Portsea, Island B	125—131	78—83	..
100,000	50	,,	12	8%	Do. C	118—121	60—65	61½
249,980	5	April 29	3	—	Primitiva Ord.	5½—6	2½—2⅝	..
499,950	5	June 26	5	2/6	Do. 5 p.c. Pref.	6½—6	3½—3⅝	..
631,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—98	74—76	75½—75½
—	—	—	—	4%	Do. ,, ,, 1911	..	52—57	55
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	55—60*	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½—11	7½—8	..
125,000	50	July 1	5	5%		47—49	45—48*	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	228—234	170—173	..
209,984	,,	,,	10	10%	Do. B	228—234	170—173	..
538,500	,,	,,	10	10%	Do. C	230—232	168—172	..
133,201	Stk.	—	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	May 28	9	6/-	South African.	10½—11½	13—14	..
6,609,895	Stk.	Feb. 10	5/4/0	32/-	South Met. 4 p.c. Ord.	111—113	75—77	75½—76⅜
250,000	,,	July 12	—	5%	Do. Pref.	..	93—95	..
1,895,445	,,	July 10	8	8%	Do. 3 p.c. Deb.	72½—74½	55—57	..
234,890	,,	Feb. 26	8½	6%	South Shields Con. Stk.	157—159	114—116	..
952,795	,,	,,	8	8½%	S'th Suburb'n Ord. 5 p.c.	114—116	77—80	76½—80
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—119	75—78	..
135,000	—	—	—	3½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	85—87*	..
647,740	,,	May 14	5	3%	Southampton Ord.	99—102	67—70	..
190,000	,,	Feb. 12	7½	5½%	Tottenham { A 5 p.c. B 5½ p.c.	135—138	92—97	..
782,275	,,	,,	6	4%	District { 4 p.c. Deb.	115—117	67—69	..
181,255	,,	June 26	4	4%		87—89	61—63	..
189,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	98—95	45—50	..
286,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	106½—109	87—88	..
80,000	,,	Feb. 26	8⅜	68/9	Wandsworth, Wimbledon, and Epsom—			
255,686	,,	,,	6⅜	48/9	Wandsworth A 5 p.c.	151—156	90—95	..
353,000	,,	,,	6⅜	42/6	Do. B 5½ p.c.	129—134	67—69	..
98,000	,,	,,	6⅜	48/9	Wimbledon 5 p.c.	117—122	70—75	..
88,416	,,	June 26	8	8%	Epsom 5 p.c.	131—136	72—77	..
					8 p.c. Deb. Stk.	85—89	60—62*	..

Ex div.

Reduction in Price by the South Suburban Company.

The following comment upon an intimation by the South Suburban Gas Company that as from the Christmas readings the price of gas will be reduced 3d. per 1000 c.ft., appeared in the "Financial News" last Wednesday: "The announcement that the South Suburban Gas Company have reduced the price of gas by 3d. per 1000 c.ft. (making it 4s., instead of 4s. 3d.) was welcome news to consumers; but it came as a staggering surprise to many other gas companies. Representatives of some of these companies congratulate the Suburban on being in a position to reduce the price. 'But,' said one expert to the Central News yesterday, 'we candidly confess that under present conditions we shall have to consider seriously before we follow suit.' This is the trend of feeling among the controllers of other companies. The following comparative prices show the rise since 1914: Gas Light and Coke—1914, 2s. 8d.; 1918, 4s. 4d. South Metropolitan, 2s. 2d., 4s. 4d.; South Suburban, 2s. 3d., 4s. 3d.; Wandsworth, 1s. 8d., 3s. 5d.; Croydon, 2s. 5d., 3s. 4d.; Commercial (London), 2s. 4d., 3s. 10d." Referring to the South Suburban Gas Company's concession to their consumers, the "Daily News" last Wednesday said: It is unlikely that any material reduction in the price of gas in London or the Provinces will take place as long as the consumption is limited by the Gas Rationing Orders. These, according to information obtained yesterday from the Fuel Controller's office, will certainly remain in force until April, and possibly until the end of the summer.

Forty-Seven Hour Week at Halifax.—The Halifax Corporation Wages Committee have approved a decision of the Gas Committee to establish a 47-hour working week at the gas-works, which involves a reduction of an hour per week.

Gas Standards and Current Conditions.—The Urban District Councils Association have decided that, in the circumstances referred to by the Board of Trade, they will offer no objection to the suggestion that up to the end of June next local authorities should refrain from taking proceedings against gas undertakings for deficiencies of calorific power, so long as the gas does not fall below 450 B.Th.U., and so long as the proportion of inert constituents in the gas is not excessive.

Increase in Price at Coventry.—The price of gas has been increased by the Corporation of Coventry 6d. per 1000 c.ft., which brings it up to 3s.

Gas Restrictions Order.—Along with the Motor Spirit Restriction Order, the Gas Restriction Order has been revoked by the Board of Trade, and will cease to have effect as from the 10th inst.

Very large additions to the plant and premises of Messrs. William Sugg & Co., Ltd., Westminster, have been made during the war, to cope with the great quantity of Government work that they have executed; and as the whole of the firm's resources are now being devoted to the manufacture of their "Littleton" and other well-known lamps and specialities, they are in a better position than ever to satisfy any requirements in the gas lighting industry.

Messrs. Chas. Page & Co., of Nos. 47-51, King William Street, E.C., announce that, chiefly for family reasons, and also to facilitate the working of an extended business, they have formed a private company under the style of Chas. Page & Co., Ltd., to carry on the trade of the firm as from the beginning of this year. The new Company are opening a branch office at No. 26, Brown Street, Manchester.

An interesting function took place on Monday of last week in the Prince of Wales Halls, Sauchiehall Street, Glasgow, when the entire suite of rooms were taken by the Glasgow Corporation Gas Survey Department, for the purpose of a dance on behalf of War Charities Purposes. Nearly 200 couples joined in a most enjoyable evening. Among those present were Bailie Drummond, Councillors Somerville and Paterson, and Mr. Ralph Halkett, the Assistant General Manager of the Gas Department.

A series of pamphlets on "Reconstruction Problems," prepared by the Ministry of Reconstruction, are being published by His Majesty's Stationery Office, and are to be purchased of any bookseller, price 2d. net. Two of the latest to be issued deal respectively with "Raw Materials and Employment" and "Work and Benefits for Soldiers and Civil War Workers." The former explains the position of the Standing Council, which will advise the Cabinet Committee on the allocation of tonnage to the different materials, and the distribution of them to the industries.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

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